DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

TM 11-5820-287-20

TO 31R2-2TRC24-62

ORGANIZATIONAL MAINTENANCE MANUAL

RADIO SETS AN/TRC-24, AN/GRC-75, AN/GRC-78, AND AN/GRC-81; RADIO TERMINAL SETS AN/TRC-35, AN/GRC-76, AN/GRC-79, AND AN/GRC-82; RADIO RELAY SET AN/TRC-36; RADIO REPEATER SETS AN/GRC-77, AN/GRC-80, AND AN/GRC-83; AND RADIO SET GROUP AN/TRA-25

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

9 January 1961

WARNING

HIGH VOLTAGE

is used in this equipment.

DEATH ON CONTACT

may result if safety precautions
are not observed.

DANGEROUS VOLTAGES ARE PRESENT AT THE FOLLOWING LOCATIONS:

Transmitter, Radio T–302(*)/TRC	750 volts direct current
Power Supply PP–685(*)/TRC	900 volts direct current
Transformer, Power, Fixed Auto Transformer TF–167/TRC	115 or 230 volts, 50 to 60 cycles

DON'T TAKE CHANCES!

TECHNICAL MANUAL
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DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *9 January 1961*

RADIO SETS AN/TRC–24, AN/GRC–75, AN/GRC–78, AND AN/GRC–81; RADIO TERMINAL SETS AN/TRC–35, AN/GRC–76, AN/GRC–79, AND AN/GRC–82; RADIO RELAY SET AN/TRC–36; RADIO REPEATER SETS AN/GRC–77, AN/GRC–80, AND AN/GRC–83; AND RADIO SET GROUP AN/TRA–25

			Paragraph	Page
CHAPTER	1.	INTRODUCTION	1, 2	3
CHAPTER	2.	UNPACKING AND CHECKING EQUIPMENT		
Section	I.	Packaging data	3–16	5
	II.	Unpacking and checking	17–25	20
CHAPTER	3.	INSTALLATION		
Section	I.	Antenna assembly	26–36	28
	II.	Radio and power components	37–39	49
CHAPTER	4.	INSTALLATION ADJUSTMENTS	40–43	57
CHAPTER	5.	MAINTENANCE INSTRUCTIONS		
Section	I.	General maintenance	44–47	61
	II.	Troubleshooting	48–49	65
	III.	Repairs	50–55	97
CHAPTER	6.	BLOCK DIAGRAM THEORY	56–58	117
CHAPTER	7.	SHIPMENT AND LIMITED STORAGE	59–60	125
APPENDIX	I.	REFERENCES		126
	II.	MAINTENANCE ALLOCATION CHART		129
INDEX				134

* This manual supersedes so much of TM 11–687, 14 September 1955; C1, 23 May 1956; C2, 7 November 1956; C3, 21 February 1957; C4, 13 May 1958; C5, 7 November 1958; C6, 22 July 1959; and C7, 26 May 1960 as is applicable to organizational maintenance and the maintenance allocation chart of TM 11–5820–287–20P, 15 June 1959.

CHAPTER 1

INTRODUCTION

1. Scope

a. This manual covers installation and second echelon maintenance of Radio Sets AN/TRC–24, AN/GRC–75, AN/GRC–78, and AN/GRC–81; Radio Terminal Sets AN/TRC–35, AN/GRC–76, AN/GRC–79, and AN/GRC–82; Radio Relay Set AN/TRC–36; Radio Repeater Sets AN/GRC–77, AN/GRC–80, and AN/GRC–83; and Radio Set Group AN/TRA–25. The operating instructions for this equipment are contained in TM 11–5820–287–10. The maintenance allocation chart is contained in appendix II.

b. Forward comments concerning this manual to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-PA2d, Fort Monmouth, N. J.

Note. For applicable forms and records, see paragraph 2, TM 11–5820–287–10.

2. Equipment Siting Considerations

An equipment site should be an open and level area (preferably an elevated area), away from obstructions such as trees, buildings, or cliffs. Figure 1 illustrates good and bad locations for transmission and reception. Observe the following considerations when selecting an equipment site.

a. Select flat cleared terrain.

b. Be sure that conditions are suitable for anchoring the antenna system.

c. Locate the site as far away as possible from buildings, roads, and powerlines.

d. Be sure that the site is accessible for transporting equipment and supplies such as gasoline, water, oil, and food.

e. Be sure sufficient area is available for the antenna installation. The minimum requirements are listed in the chart below.

Note. Two antenna installations are required at a radio repeater site. Two antenna installations are also required for a double-stacked A-band antenna system at a radio terminal site.

Number of antenna installations	Area dimensions (ft)
1	80 x 100
2	210 x 100
4	420 x 100

TM5820-287-20-1

Figure 1. Good and bad siting locations.

CHAPTER 2

UNPACKING AND CHECKING EQUIPMENT

Section I. PACKAGING DATA

3. General

a. Packaging data for each radio set, radio terminal set, radio relay set, and radio repeater set is provided as follows:

(1) Radio sets (para 4 through 7).
(2) Radio terminal sets (para 8 through 11).
(3) Radio relay set (para 12).
(4) Radio repeater sets (para 13 through 15).
(5) Radio set group (para 16).

b. Refer to the applicable paragraph to determine the number of cases and the contents of each case.

c. Paragraphs 17 through 25 provide unpacking information for removing the contents of each case (*b* above) and checking information which should be performed after the equipment is unpacked.

4. Radio Set AN/TRC–24

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/TRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (to ea).	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G ..	12⅝	18¾	21¼	2.9	140
	8	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	9	Case, mast	5½	18¾	71	3.7	98
	10	Case, mast	5½	18¾	71	3.7	98
	11	Case, mast	5½	18¾	71	3.7	98
	12	Reel, Cable RC–404/TR (2 ea).	14	25⅞	27⅝	5.3	103
Antenna Group OA–1389/GRC	13	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	14	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Antenna Filter Group OA–1393/GRC (B-band).	15	Case, Antenna CY–1371/TRC ..	10½	18⅛	29¾	3.3	84
	16	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
Antenna Filter Group OA–1395/GRC (C-band).	17	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	18	Case, Antenna CY–1370/TRC ..	10⅛	22½	25⅛	3.6	73
Amplifier Group OA–1394/GRC (C-band).	19	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Amplifier Group OA–1392/GRC (B-band).	20	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Radio Set Group OA–1387/GRC ..	21	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	22	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	23	Case, Power Supply CY–1340/TRC.	18¾	18½	21	4.2	133
	24	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	25	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66

5. Radio Set AN/GRC–75

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/GRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea)	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	8	Carrying case, guy stake	5⅞	20½	51¼	3.6	140
	9	Case, mast	5½	18¾	71	3.7	98
	10	Case, mast	5½	18¾	71	3.7	98
	11	Case, mast	5½	18¾	71	3.7	98
	12	Reel, Cable RC–404/TR (2 ea)	14	25⅞	27⅝	5.3	103
Antenna Filter Group OA–1391/GRC (A-band).	13	Case, Antenna CY–1760/GRC ..	10⅝	20¼	77¾	9.6	165
	14	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
Amplifier Group OA–1390/GRC (A-band).	15	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Radio Set Group OA–1387/GRC	16	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	17	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	18	Case, Power Supply CY–1340/TRC.	18¾	18½	21	4.2	133
	19	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	20	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66

6. Radio Set An/GRC–78

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/TRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX-148/G (2 ea) ..	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G ..	12⅝	18¾	21¼	2.9	140
	8	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	9	Case, mast	5½	18¾	71	3.7	98
	10	Case, mast	5½	18¾	71	3.7	98
	11	Case, mast	5½	18¾	71	3.7	98
	12	Reel, Cable RC–404/TR (2 ea).	14	25⅞	27⅝	5.3	103
Amplifier Group OA–1392/GRC (B-band).	13	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Amplifier Group OA–1396/GRC (D-band).	14	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Antenna Filter Group OA–1397/GRC (D-band).	15	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	16	Case, Antenna CY–1761/TRC ..	10⅝	22¾	25⅞	3.6	73
Antenna Group OA–1389/GRC	17	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	18	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Radio Set Group OA–1387/GRC.	19	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	20	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	21	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	22	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	23	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
Antenna Filter Group OA–1393/GRC (B-band).	24	Case, Antenna CY–1371/TRC ..	10½	18⅛	29¾	3.3	84
	25	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72

7. Radio Set AN/GRC–81

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/TRC.	18⅝	21⅝	22½	5.2	145

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea)..	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	8	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	9	Case, mast	5½	18¾	71	3.7	98
	10	Case, mast	5½	18¾	71	3.7	98
	11	Case, mast	5½	18¾	71	3.7	98
	12	Reel, Cable RC–404/TR (2 ea).	14	25⅞	27⅝	5.3	103
Antenna Group OA–1389/GRC	13	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	14	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Radio Set Group OA–1387/GRC	15	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	16	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	17	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	18	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	19	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
Amplifier Group OA–1394/GRC (C-band).	20	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Antenna Filter Group OA–1395/GRC (C-band).	21	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	22	Case, Antenna CY–1370/TRC ..	10⅛	22½	25⅛	3.6	73

8. Radio Terminal Set AN/TRC–35

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/GRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea) ..	¾	1¾	72	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	8	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	9	Case, mast	5½	18¾	71	3.7	98
	10	Case, mast	5½	18¾	71	3.7	98
	11	Case, mast	5½	18¾	71	3.7	98
	12	Reel, Cable RC–404/TR (2 ea)..	14	25⅞	27⅝	5.3	103
Antenna Group OA–1389/GRC	13	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	14	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Antenna Filter Group OA–1393/GRC (B-band).	15	Case, Antenna CY–1371/TRC ..	10½	18⅛	29¾	3.3	84
	16	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
Antenna Filter Group OA–1395/GRC (C-band).	17	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	18	Case, Antenna CY–1370/TRC ..	10⅛	22½	25⅛	3.6	73
Amplifier Group OA–1394/GRC (C-band).	19	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	20	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Amplifier Group OA–1392/GRC (B-band).	21	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	22	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Radio Set Group OA–1387/GRC ..	23	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	24	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	25	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	26	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	27	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	28	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	29	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	30	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	31	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	32	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66

9. Radio Terminal Set AN/GRC–76

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/TRC.	18⅝	21⅝	22½	5.2	145

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea)..	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G ..	12⅝	18¾	21¼	2.9	140
	8	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	9	Case, mast	5½	18¾	71	3.7	98
	10	Case, mast	5½	18¾	71	3.7	98
	11	Case, mast	5½	18¾	71	3.7	98
	12	Reel, Cable RC–404/TR (2 ea)..	14	25⅞	27⅝	5.3	103
Antenna Filter Group OA–1391/GRC (A-band).	13	Case, Antenna CY–1760/GRC ..	10⅝	20¼	77¾	9.6	165
	14	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
Amplifier Group OA–1390/GRC (A-band).	15	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	16	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Radio Set Group OA–1387/GRC	17	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	18	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	19	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	20	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	21	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	22	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	23	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	24	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	25	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	26	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66

10. Radio Terminal Set AN/GRC–79

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/TRC.	18⅝	21⅝	22½	5.2	145

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea)..	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G ..	12⅝	18¾	21¼	2.9	140
	8	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	9	Case, mast	5½	18¾	71	3.7	98
	10	Case, mast	5½	18¾	71	3.7	98
	11	Case, mast	5½	18¾	71	3.7	98
	12	Reel, Cable RC–404/TR (2 ea)..	14	25⅞	27⅝	5.3	103
Amplifier Group OA–1392/GRC (B-band).	13	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	14	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Amplifier Group OA–1396/GRC (D-band).	15	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	16	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Antenna Group OA–1389/GRC	17	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	18	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Antenna Filter Group OA–1397/GRC (D-band).	19	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	20	Case, Antenna CY–1761/TRC ..	10⅝	22¾	25⅞	3.6	73
Radio Set Group OA–1387/GRC	21	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	22	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	23	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	24	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	25	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	26	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	27	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	28	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
	29	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	30	Transformer, Power, Fixed Auto.	13⅞	14⅜	18⅞	1.9	66
Antenna Filter Group OA–1393/GRC (B-band).	31	Case, Antenna CY–1371/TRC ..	10½	18⅛	29¾	3.3	84
	32	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72

11. Radio Terminal Set AN/GRC–82

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/GRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea)..	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G ..	12⅝	18¾	21¼	2.9	140
	8	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	9	Case, mast	5½	18¾	71	3.7	98
	10	Case, mast	5½	18¾	71	3.7	98
	11	Case, mast	5½	18¾	71	3.7	98
	12	Reel, Cable RC–404/TR (2 ea)..	14	25⅞	27⅝	5.3	103
Antenna Group OA–1389/GRC	13	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	14	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Radio Set Group OA–1387/GRC	15	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	16	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	17	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	18	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	19	Case, Power Supply CY–1340/TRC.	18¾	18½	21	4.2	133
	20	Case, Power Supply CY–1340/TRC.	18¾	18½	21	4.2	133
	21	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	22	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	23	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	24	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Amplifier Group OA–1394/GRC (C-band).	25	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	26	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Antenna Filter Group OA–1395/GRC (C-band).	27	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	28	Case, Antenna CY–1370/TRC ..	10⅛	22½	25⅛	3.6	73

12. Radio Relay Set AN/TRC–36

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1341/GRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	191
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea)..	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	8	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	9	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	10	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	11	Case, mast	5½	18¾	71	3.7	98
	12	Case, mast	5½	18¾	71	3.7	98
	13	Case, mast	5½	18¾	71	3.7	98
	14	Case, mast	5½	18¾	71	3.7	98
	15	Case, mast	5½	18¾	71	3.7	98
	16	Case, mast	5½	18¾	71	3.7	98
	17	Reel, Cable RC–404/TR (2 ea)..	14	25⅞	27⅝	5.3	103
	18	Reel, Cable RC–404/TR (2 ea)..	14	25⅞	27⅝	5.3	103
Antenna Group OA–1389/GRC	19	Case, Antenna Reflector Support CY–1387/GRC.	7½	30¼	34⅜	4.5	75
	20	Case, Antenna Reflector Support CY–1387/GRC.	7½	30¼	34⅜	4.5	75
	21	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
	22	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Antenna Filter Group OA–1393/GRC (B-band).	23	Case, Antenna CY–1371/TRC ..	10½	18⅛	29¾	3.3	84
	24	Case, Antenna CY–1371/TRC ..	10½	18⅛	29¾	3.3	84
	25	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72

Component Groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
	26	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
Antenna Filter Group OA–1395/GRC (C-band).	27	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	28	Case, Antenna CY–1380/TRC ..	10⅛	22½	25⅛	3.6	73
Amplifier Group OA–1394/GRC (C-band).	29	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	30	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	31	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Amplifier Group OA–1392/GRC (B-band).	32	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	33	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	34	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Radio Set Group OA–1387/GRC ..	35	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	36	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	37	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	38	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	39	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	40	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	41	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	42	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	43	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	44	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	45	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	46	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	47	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	48	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	49	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66

13. Radio Repeater Set AN/GRC–77

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/TRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea)..	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G ..	12⅝	18¾	21¼	2.9	140
	8	Case, Accessories CY–1392/G ..	12⅝	18¾	21¼	2.9	140
	9	Carrying case, guy stake	5⅛	20½	51½	3.6	140
	10	Carrying case, guy stake	5⅛	20½	51½	3.6	140
	11	Case, mast	5½	18¾	71	3.7	98
	12	Case, mast	5½	18¾	71	3.7	98
	13	Case, mast	5½	18¾	71	3.7	98
	14	Case, mast	5½	18¾	71	3.7	98
	15	Case, mast	5½	18¾	71	3.7	98
	16	Case, mast	5½	18¾	71	3.7	98
	17	Reel, Cable RC–404/TR (2 ea)..	14	25⅞	27⅝	5.3	103
	18	Reel, Cable RC–404/TR (2 ea)..	14	25⅞	27⅝	5.3	103
Antenna Filter Group OA–1391/GRC (A-band).	19	Case, Antenna CY–1760/GRC ..	10⅝	20¼	77¾	9.6	165
	20	Case, Antenna CY–1760/GRC ..	10⅝	20¼	77¾	9.6	165
	21	Case, Accessories CY–1760/GRC.	18⅝	13⅛	21	2.9	72
	22	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
Amplifier Group OA–1390/GRC (A-band).	23	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	24	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	13⅛	21¼	4.1	44
	25	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Radio Set Group OA–1387/GRC	26	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	27	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	28	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	29	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	30	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	31	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	32	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
	33	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	34	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	35	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	36	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	37	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	38	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	39	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	40	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66

14. Radio Repeater Set An/GRC–80

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/TRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¾	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea) ..	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	8	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	9	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	10	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	11	Case, mast	5½	18¾	71	3.7	98
	12	Case, mast	5½	18¾	71	3.7	98
	13	Case, mast	5½	18¾	71	3.7	98
	14	Case, mast	5½	18¾	71	3.7	98
	15	Case, mast	5½	18¾	71	3.7	98
	16	Case, mast	5½	18¾	71	3.7	98
	17	Reel, Cable RC–404/TR (2 ea).	14	25⅞	27⅝	5.3	103
	18	Reel, Cable RC–404/TR (2 ea).	14	25⅞	27⅝	5.3	103
Amplifier Group OA–1392/GRC (B-band).	19	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	20	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	21	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Amplifier Group OA–1396/GRC (D-band).	22	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	23	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	24	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Antenna Group OA–1389/GRC	25	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	26	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	27	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
	28	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Antenna Filter Group OA–1397/GRC (D-band).	29	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	30	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	31	Case, Antenna CY–1761/GRC ..	10⅝	22¾	25⅞	3.6	73
	32	Case, Antenna CY–1761/GRC ..	10⅝	22¾	25⅞	3.6	73
Radio Set Group OA–1387/GRC	33	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	34	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	35	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	36	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	37	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	38	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	39	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	40	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	41	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	42	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	43	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	44	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	45	Transformers, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅛	1.9	66
	46	Transformers, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅛	1.9	66
	47	Transformers, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅛	1.9	66

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
Antenna Filter Group OA–1393/GRC (B-band).	48	Case, Antenna CY–1371/TRC ..	10½	18½	29¾	3.3	84
	49	Case, Antenna CY–1371/TRC ..	10½	18½	29¾	3.3	84
	50	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	51	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72

15. Radio Repeater Set AN/GRC–83

Power Accessories Group OA–1676/GRC.	1	Case, Accessories CY–1343/TRC.	18⅝	21⅝	22½	5.2	145
Generator Set Group OA–1675/GRC.	2	Reel, Cable RC–405/TR	15⅛	31¼	31¼	8.5	181
	3	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	4	Generator Set, Gasoline Engine PU–286/G.	40½	30½	53½	38.3	874
	5	Ground Rod MX–148/G (2 ea)	72	1¾	¾	0.05	15
	6	Drum, gasoline (10 ea)	34¼	21¼	29¾	12.5	140
Antenna Accessories Group OA–1398/GRC.	7	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	8	Case, Accessories CY–1392/G.	12⅝	18¾	21¼	2.9	140
	9	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	10	Carrying case, guy stake	5⅞	20½	51½	3.6	140
	11	Case, mast	5½	18¾	71	3.7	98
	12	Case, mast	5½	18¾	71	3.7	98
	13	Case, mast	5½	18¾	71	3.7	98
	14	Case, mast	5½	18¾	71	3.7	98
	15	Case, mast	5½	18¾	71	3.7	98
	16	Case, mast	5½	18¾	71	3.7	98
	17	Reel, Cable RC–404/TR (2 ea).	14	25⅞	27⅝	5.3	103
	18	Reel, Cable RC–404/TR (2 ea).	14	25⅞	27⅝	5.3	103
Antenna Group OA–1389/GRC	19	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	20	Case, Antenna Reflector Support CY–1387/TRC.	7½	30¼	34⅜	4.5	75
	21	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
	22	Case, Antenna Reflector CY–1385/TRC.	13	34¼	51¾	13.1	137
Radio Set Group OA–1387/GRC	23	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	24	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	25	Case, Transmitter CY–1341/TRC.	18¾	21½	22½	5.2	122
	26	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100

Component groups	Case No.	Contents	Dimensions (in.)			Volume (cu ft)	Weight (lb)
			Height	Width	Depth		
	27	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	28	Case, Receiver CY–1339/TRC ..	18½	18	21	4.1	100
	29	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	30	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	31	Case, Power Supply CY–1340/TRC.	18¾	18⅛	21	4.2	133
	32	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	33	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	34	Case, Accessories CY–1342/TRC.	18⅝	21⅝	22½	5.2	118
	35	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	36	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
	37	Transformer, Power, Fixed Auto Transformer TF–167/TRC.	13⅞	14⅜	18⅞	1.9	66
Amplifier Group OA–1394/GRC (C-band).	38	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	39	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
	40	Case, Standardized Components, Electrical CY–1338/TRC.	18⅝	17⅞	21¼	4.1	44
Antenna Filter Group OA–1395/GRC (C-band).	41	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	42	Case, Accessories CY–1344/TRC.	18⅝	13⅛	21	2.9	72
	43	Case, Antenna CY–1370/TRC ..	10⅛	22½	25⅛	3.6	73
	44	Case, Antenna CY–1370/TRC ..	10⅛	22½	25⅛	3.6	73

16. Radio Set Group AN/TRA–25

	1	Case CY–2854/TRA–25 containing: Amplifier AM–2537/TRA–25, Oscillator OA–735/TRA–25, and Mixer Stage CV–932/TRA–25.	19⅜	18⅜	22⅞	4.7	88
	2	Case, Antenna CY–2853/TRA–25.	17⅞	32⅛	33⅛	11	117
	3	Case, Antenna CY–2853/TRA–25.	17⅞	32⅛	33⅛	11	117
	4	Antenna Assembly AS–1083/TRA–25, spare tubes and Oscillator-Multiplier O–734/TRA–25.	13½	13¼	35	3.6	48

Section II. UNPACKING AND CHECKING

17. General

Locate the equipment at the site (para 2) before unpacking the components. The unpacking and unpackaging procedures are given in *a* through *g* below.

***Caution:* Do not attempt to pry off the wooden covers because this will damage the equipment.**

a. Equipment in carrying cases (except guy stake carrying case and mast case) (para 18).

b. Reel, Cable RC–404/TR or RC–405/TR (para 19).

c. Generator Set, Gasoline Engine PU–286/G (para 20).

d. Ground Rods MX–148/G (para 21).

e. Gasoline drums (para 22).

f. Mast case or guy stake carrying case (para 23).

g. Antenna Assembly AS–1083/TRA–25, spare tubes, and Oscillator-Multiplier O–734/TRA–25 (F-band) (para 24).

18. Equipment in Carrying Cases

(fig. 2)

a. Cut and fold back the metal straps near the wooden cover.

b. Remove the nails from the wooden cover and remove the cover.

c. Open the moistureproof barrier that covers the outer corrugated carton and remove the outer corrugated carton from the wooden box.

d. Remove the water-resistant pressure-sensitive tape from the top of the outer corrugated carton.

e. Open and fold down the sides of the outer corrugated carton and open the moistureproof-vaporproof barrier.

f. Remove the inner corrugated carton and fold down the sides of the inner corrugated carton.

g. Remove the corrugated fillers, the desiccant, and the carrying case, containing the equipment from the inner corrugated carton.

19. Reel, Cable RC–404/TR or RC–405/TR

(fig. 3)

a. Cut the metal straps near the wooden cover.

b. Remove the nails from the wooden cover and remove the wooden cover.

c. Remove the RC–404/TR or RC–405/TR from the wooden box.

20. Generator Set, Gasoline Engine PU–286/G

(fig. 4)

Cases 3 and 4 of all sets, except Radio Set Group AN/TRA–25, contain Generator Set, Gasoline Engine PU–286/G. The bottom of the wooden box is constructed to form a skid base and can be used for sliding the wooden box a short distance.

a. Cut the metal straps near the bottom of the wooden box.

b. Remove the nails at the bottom of the sides and ends of the wooden box.

c. Remove the wooden box by lifting it straight up.

d. Remove the moistureproof-vaporproof barrier.

e. Loosen the draw cord and remove the canvas cover.

f. Remove the paperboard wrapping cushion from the PU–286/G.

g. Remove the carriage bolts and nuts that secure the PU–286/G to the skid base.

21. Ground Rod MX–148/G

(fig. 5)

a. Cut the tape and remove the burlap covers.

b. Cut the tape and separate the ground rods.

22. Gasoline Drums

(fig. 6)

a. Cut the metal straps on the wooden crate cover.

b. Remove the nails from the wooden crate cover and remove the cover.

c. Remove the moistureproof barrier containing the gasoline spouts from the wooden crate.

d. Remove the gasoline drums from the wooden crate.

23. Mast Case or Guy Stake Carrying Case

(fig. 7)

a. Cut the metal straps near the wooden cover.

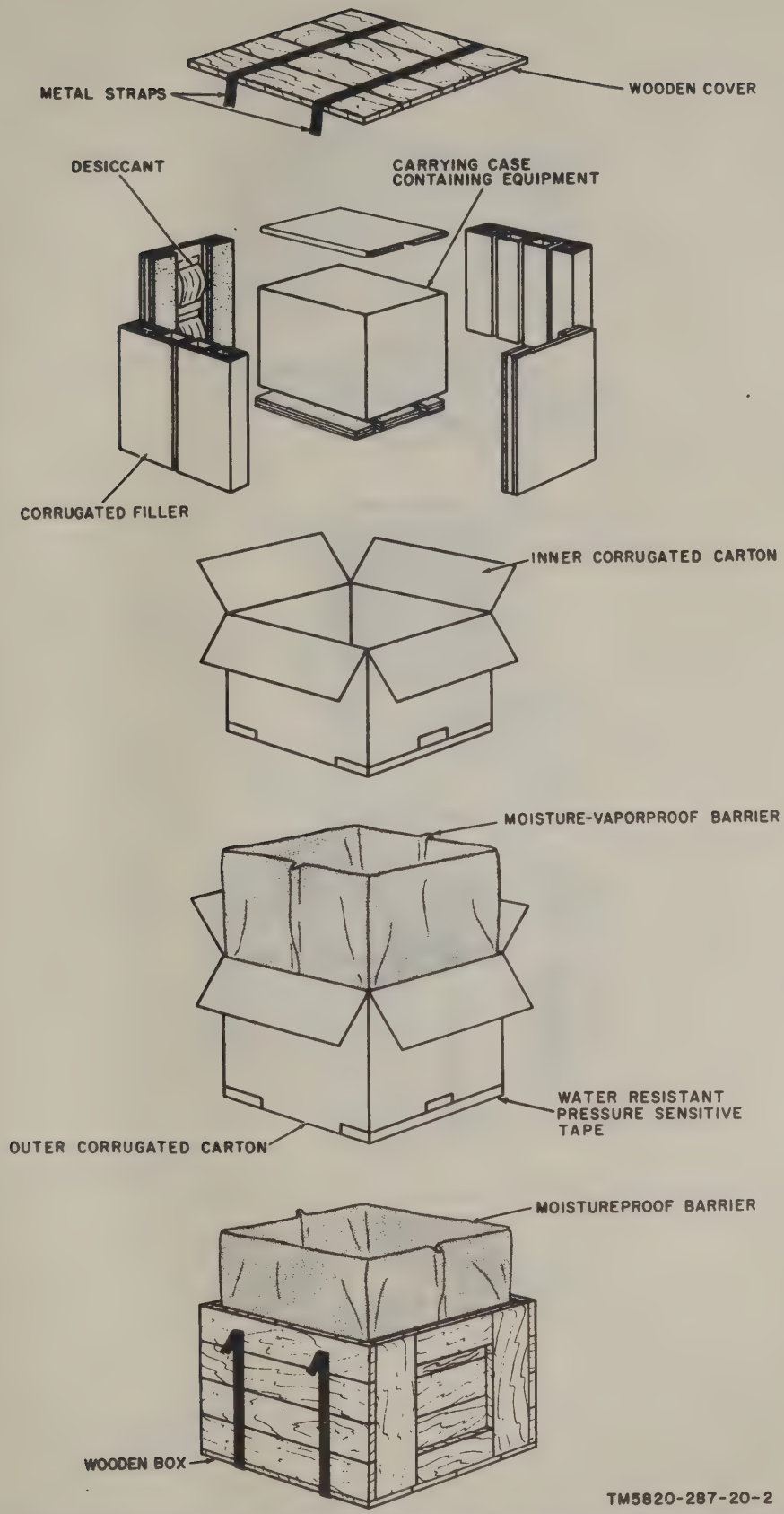


Figure 2. Typical packing and packaging diagram for equipment in carrying cases.

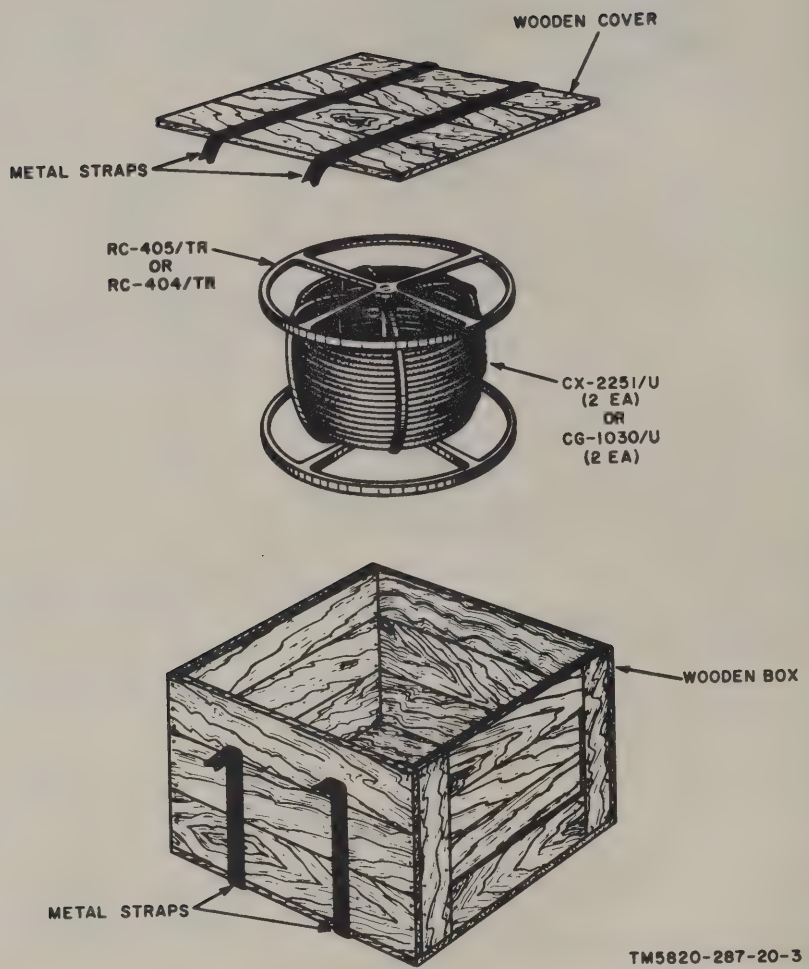


Figure 3. Packaging and packing diagram for Reel, Cable RC–404/TR or RC–405/TR.

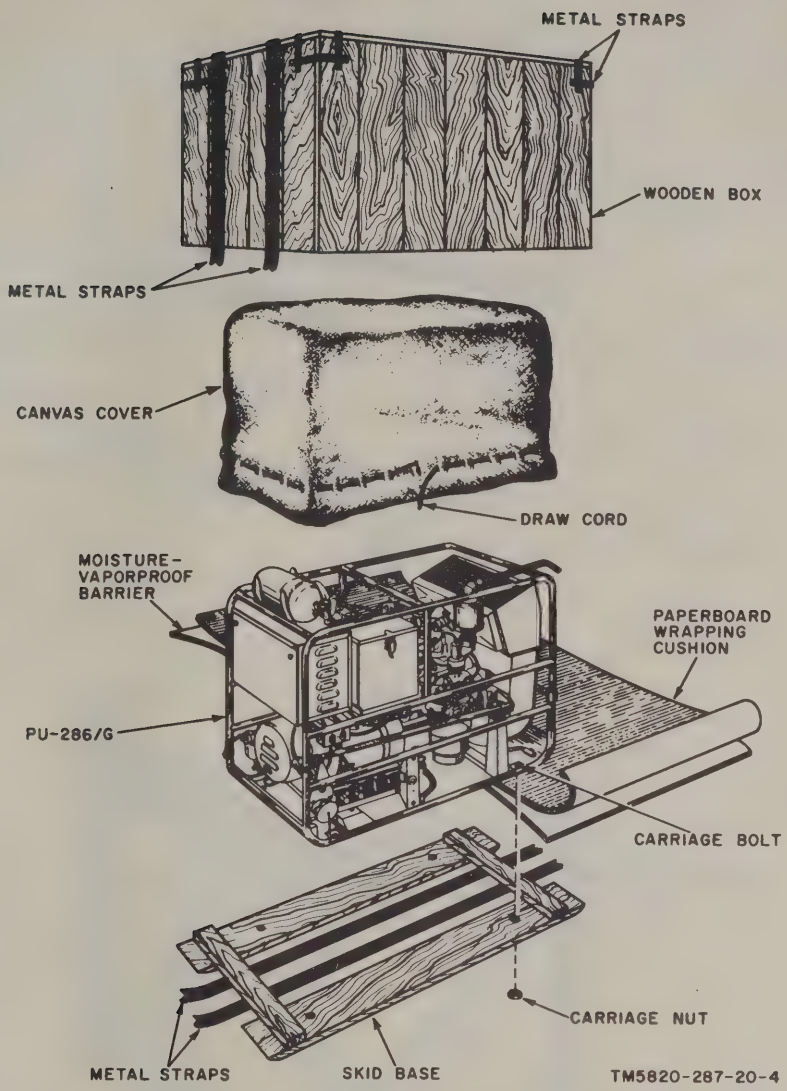


Figure 4. Packaging and packing diagram for PU–286/G.

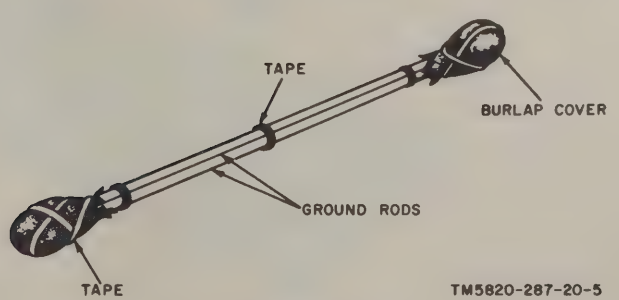


Figure 5. Packaging and packing diagram for Ground Rod MX–148/G.

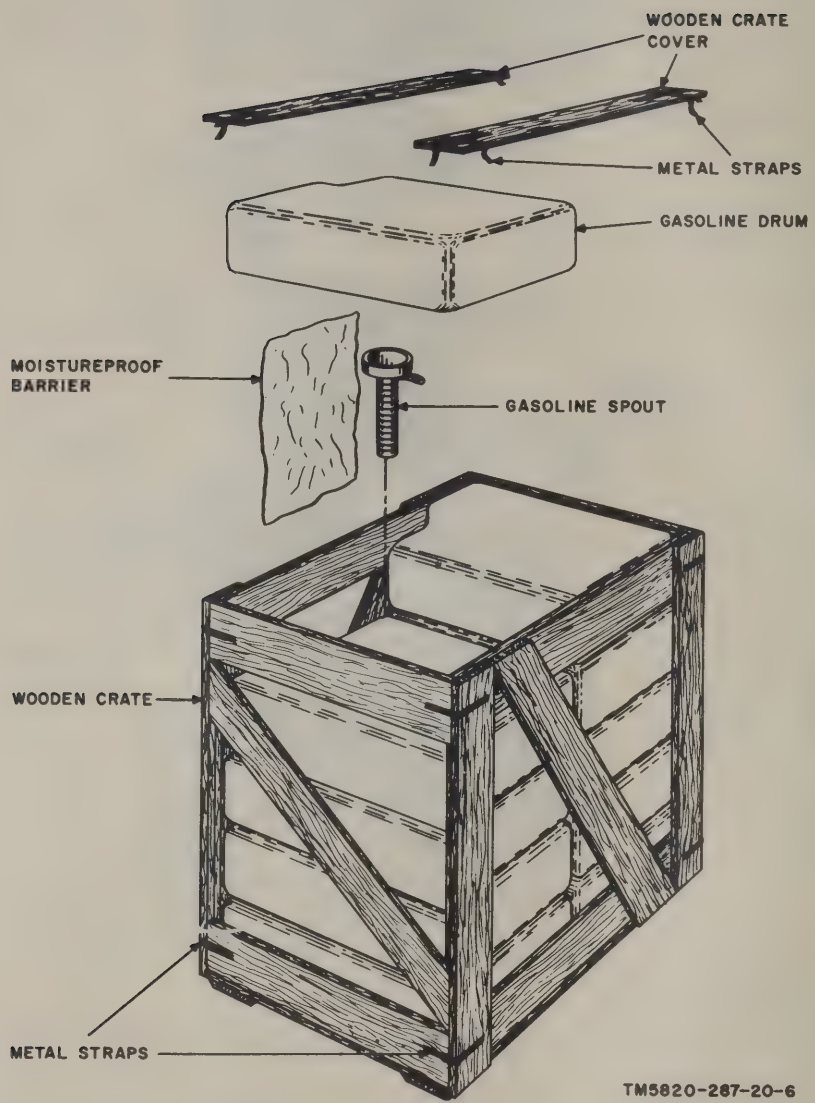


Figure 6. Packaging and packing diagram for gasoline drums.

b. Remove the nails from the wooden cover and remove the cover.

c. Remove the fiberboard box from the wooden box.

d. Cut the water-resistant pressure-sensitive tape on the top of the fiberboard box.

e. Fold down the sides of the fiberboard box, raise the top of the inner fiberboard sleeve, and remove the mast case or guy stake carrying case.

24. Antenna Assembly AS–1083/TRA–25, Spare Tubes and Oscillator-Multiplier O–734/TRA–25 (F-Band)

(fig. 8)

a. Cut and fold back the metal straps near the wooden cover.

b. Remove the nails from the wooden cover and remove the cover.

c. Remove the fiberboard boxes and the package with paperboard cushioning wrapping from the wooden box.

d. Open and fold back the sides of the fiberboard box containing the AS–1030/TRA–25.

e. Remove the fiberboard blocking from the AS–1030/TRA–25.

f. Remove the AS–1030/TRA–25 from the fiberboard box.

g. Remove the paperboard cushioning wrap-

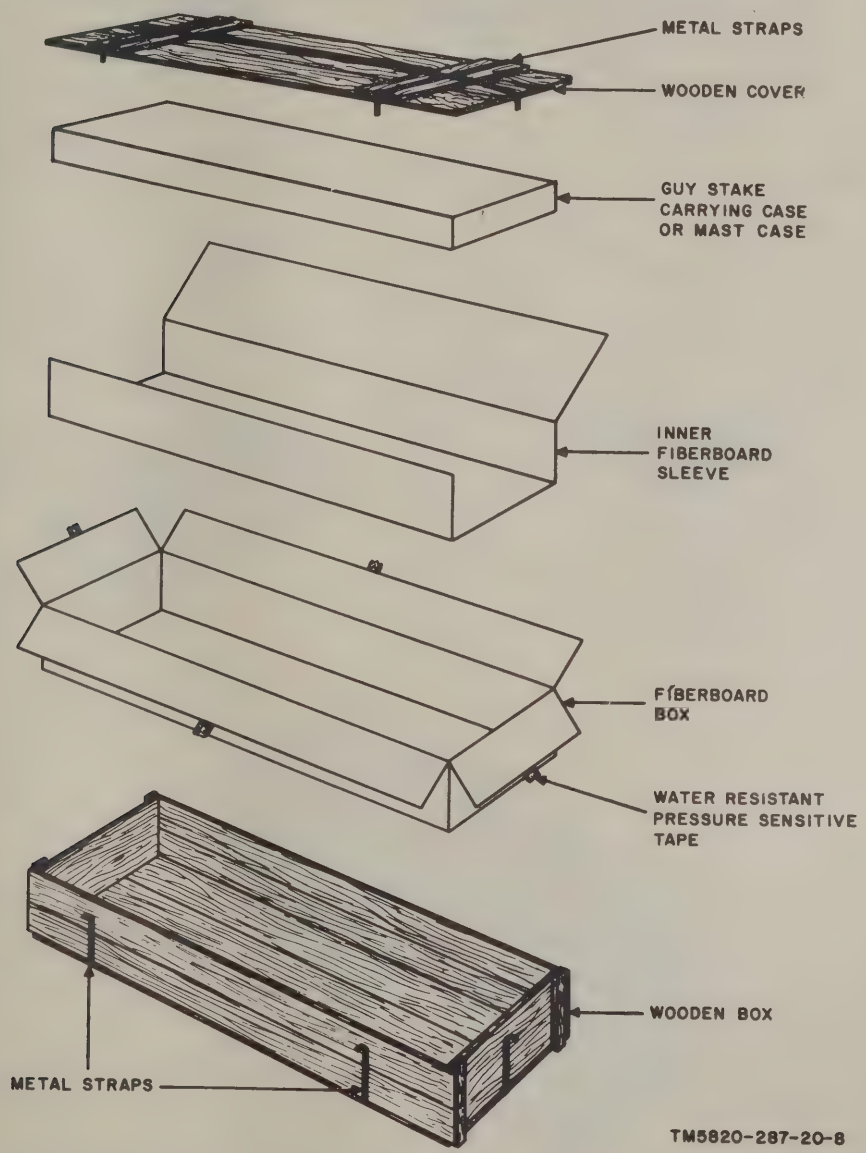


Figure 7. Packaging and packing diagram for mast case or guy stake carrying case.

ping and waterproof barrier from the fiberboard box containing the O–734/TRA–25.

h. Open and fold down the sides of the fiberboard box containing the O–734/TRA–25.

i. Remove the top pad and sleeve from the O–734/TRA–25.

j. Remove the O–734/TRA–25 from the fiberboard box.

k. Open and fold back the sides of the fiberboard box containing the spare tubes and remove the contents.

25. Checking

a. Refer to the unpacking list supplied with the equipment and check the contents of each case against the packing list. When no packing list accompanies the equipment, the table of components (TM 11–5820–287–10) and/or the packaging data (para 3 through 16) may be used as a general check to indicate the equipment which *probably* was packed.

b. Inspect the equipment for damage which may have occurred during shipment.

c. Refer to TM 11–940A to check the PU–286/G.

d. If an incomplete or improper shipment exists, refer to paragraph 2 of TM 11–5820–287–10.

e. If the equipment has been used or reconditioned, check to see whether it has been changed by a modification work order (MWO). If modified, the MWO number will appear on the front panel near the nomenclature plate.

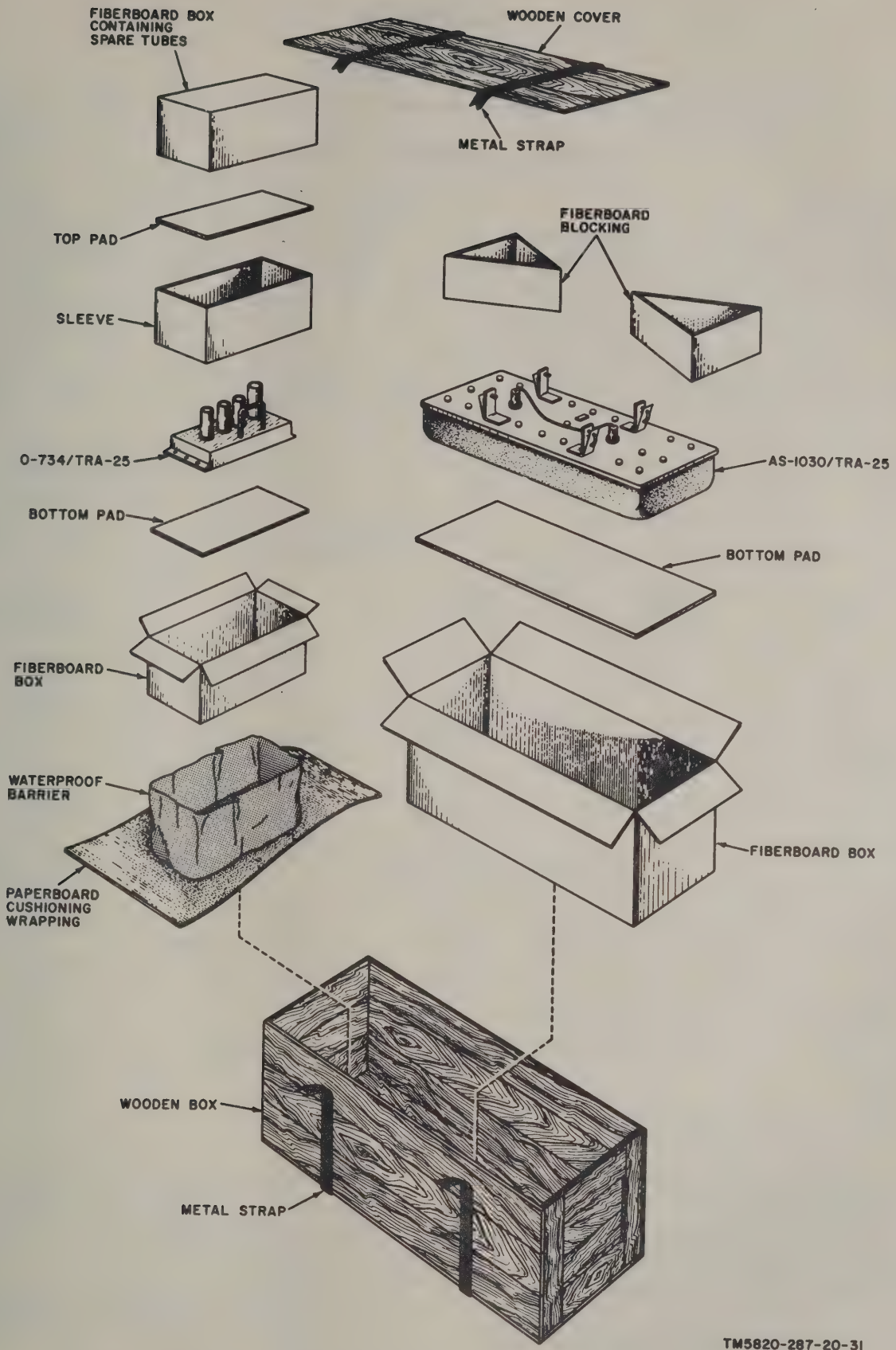


Figure 8. Packaging and packing diagram for Antenna Assembly AS–1083/TRA–25, spare tubes, and Oscillator-Multiplier O–734/TRA–25 (F-band).

CHAPTER 3

INSTALLATION

Section I. ANTENNA ASSEMBLY

26. General

This section covers the procedures for assembling, erecting, and securing the antenna assembly (antenna support and antenna). Refer to paragraph 2 for siting considerations.

a. The same antenna support is used with the A-, B-, C-, D-, and F-band antennas. The procedures for assembling the antenna support are covered in paragraphs 27 through 30. If the antenna must be installed higher than 50 feet above the ground, use the AB–216/U (TM 11–5073) as the antenna support.

b. The procedures for assembling and installing the desired antenna on the antenna support are covered as follows:

(1) A-band antenna (para 31).
(2) B-band antenna (para 32).
(3) C-band antenna (para 33).
(4) D-band antenna (para 34).
(5) F-band antenna (para 35).

c. The procedures for erecting and securing the antenna assembly are covered in paragraph 36.

d. The type of equipment, the operating frequency (A-, B-, C-, D-, or F-band), the antenna polarization, and the antenna configuration determine the number of antenna assemblies required at a site. Refer to the chart below.

Type of equipment	Operating frequency (band)	Antenna polarization	Antenna configuration	No. of antenna assemblies required
Radio set or radio terminal set	A	Horizontal or vertical	Single-stacked	1
			Double-stacked[a]	2
Radio relay set or radio repeater set	A	Horizontal or vertical	Single-stacked	2
			Double-stacked[a]	4
Radio set or radio terminal set	B, C, D	Horizontal or vertical	Single reflector	2
			Double reflector	1
Radio relay set or radio repeater set	B, C, D	Horizontal or vertical	Single reflector	4
			Double reflector	2
Radio set or radio terminal set	F	Horizontal	Double reflector	1
Radio relay or radio repeater set	F	Horizontal	Double reflector	2

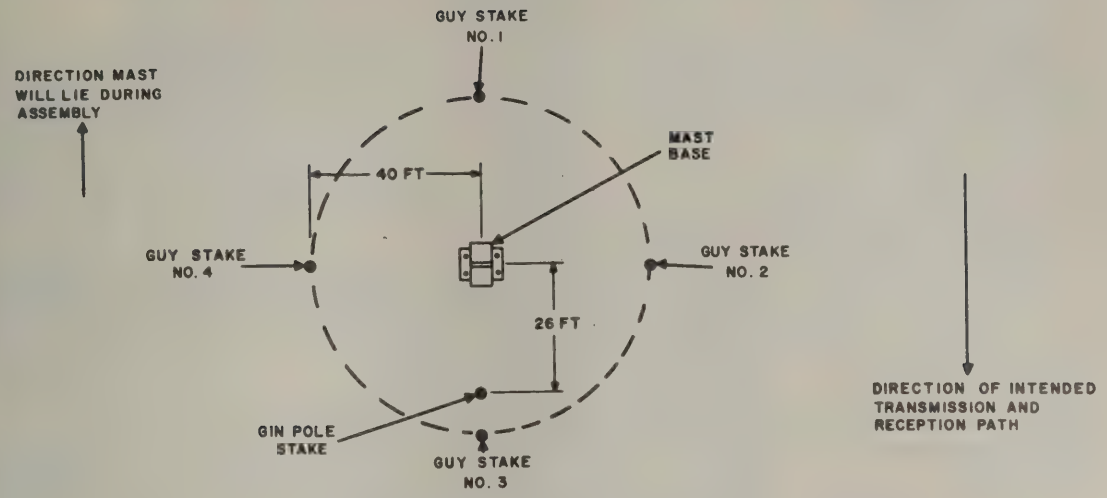
[a] A-band antenna is double-stacked for reception of extremely weak signals only.

27. Preparation for Assembly of Antenna Support

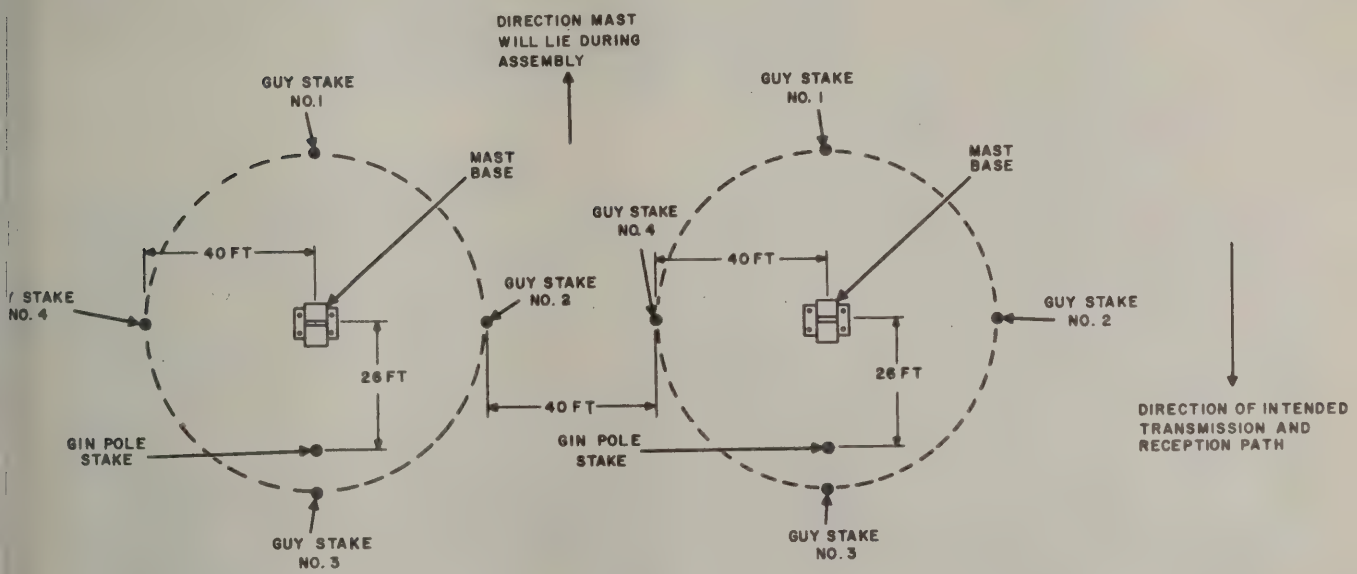
a. Establishing Ground Layout Plan. Refer to figure 9 and determine the locations for the mast base, the gin pole stake, and the guy stakes.

b. Positioning and Securing Mast Base.

(1) Remove the mast base (fig. 10) from Case, Accessories CY–1392/G (TM 11–5820–287–10).
(2) Loosen the swivel locks.
(3) Rotate the swivel until the index mark is aligned with the zero mark on the base plate.



A. GROUND LAYOUT PLAN FOR ONE ANTENNA ASSEMBLY.



B. GROUND LAYOUT PLAN FOR TWO ANTENNA ASSEMBLIES.

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Figure 9. Antenna assembly, ground layout plans.

(4) Finger-tighten the swivel locks.

(5) Position the mast base in the center of the ground layout plan (fig. 9) so that the zero mark on the base plate faces the direction in which the mast will lie during assembly.

Note. The direction in which the mast will lie during assembly should be in line with the intended transmission and reception path on the opposite side of the mast base.

(6) Position the GIN POLE tube and the MAST tube as shown in figure 10.

(7) Remove Stakes GP–2 from the guy stake carrying case (TM 11–5820–287–10).

(8) Anchor the mast base in position with Stakes GP–2 as shown in A, figure 11.

(9) Raise the GIN POLE tube to the vertical position and lower it over the 90 mark on the base plate as shown in B, figure 11.

c. Anchoring Guy and Gin Pole Stakes.

(1) Remove Stakes, Guy GP–113/G (A, fig. 12) from the guy stake carrying case (TM 11–5820–287–10).

(2) Refer to figure 9 to determine the locations of guy stakes No. 1 through 4 and gin pole stake.

(3) Anchor guy stakes No. 1 through 4 and the gin pole stake as shown in B, figure 12.

28. Gin Pole Assembly

a. Remove five Mast Sections AB–332/G from the mast case.

b. Install a mast section on the GIN POLE tube as shown in figure 13. Be sure the locking pin on the mast section is in the locking slot of the GIN POLE tube so that the end of the mast section butts against the stop of the GIN POLE tube.

c. Install the four remaining mast sections sequentially on the mast section on the GIN POLE tube. Be sure the locking pin on each mast section is in the locking slot of the mast section on which it mounts so that the end of the mast section butts against the stop on the mast section.

d. Install the gin pole cap (fig. 20) on the last mast section of the gin pole with the guy attachment holes facing the direction that the mast will lie.

29. Mast Assembly

Follow the procedures given in *a* below when assembling the mast for the A-band antenna support. Follow the procedures given in *b* below when assembling the mast for the B-, C-, or D-band antenna support. Follow the procedures given in *c* below when assembling the mast for the F-band antenna support.

a. A-Band.

(1) Remove nine Mast Sections AB–332/G from the mast case.

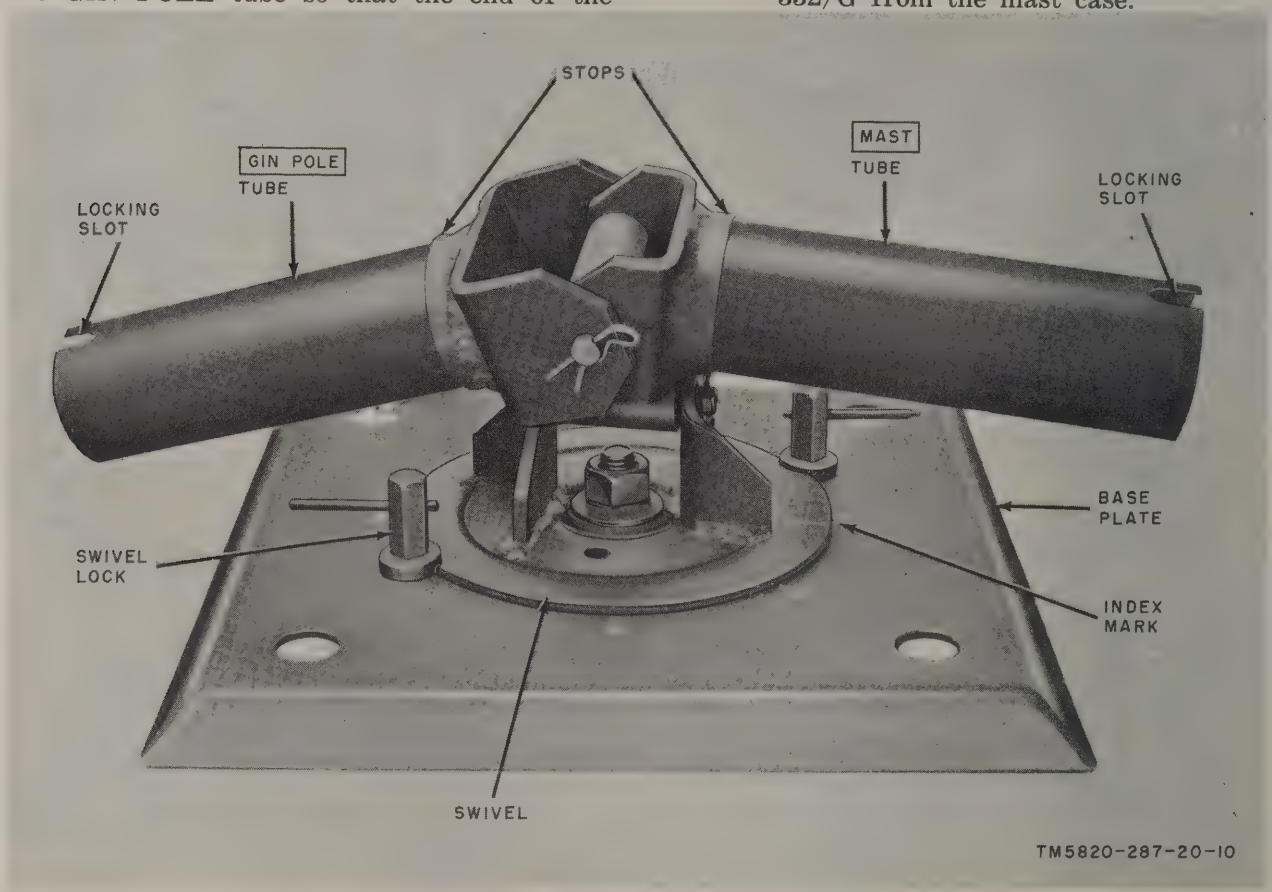


Figure 10. Mast base of antenna support.

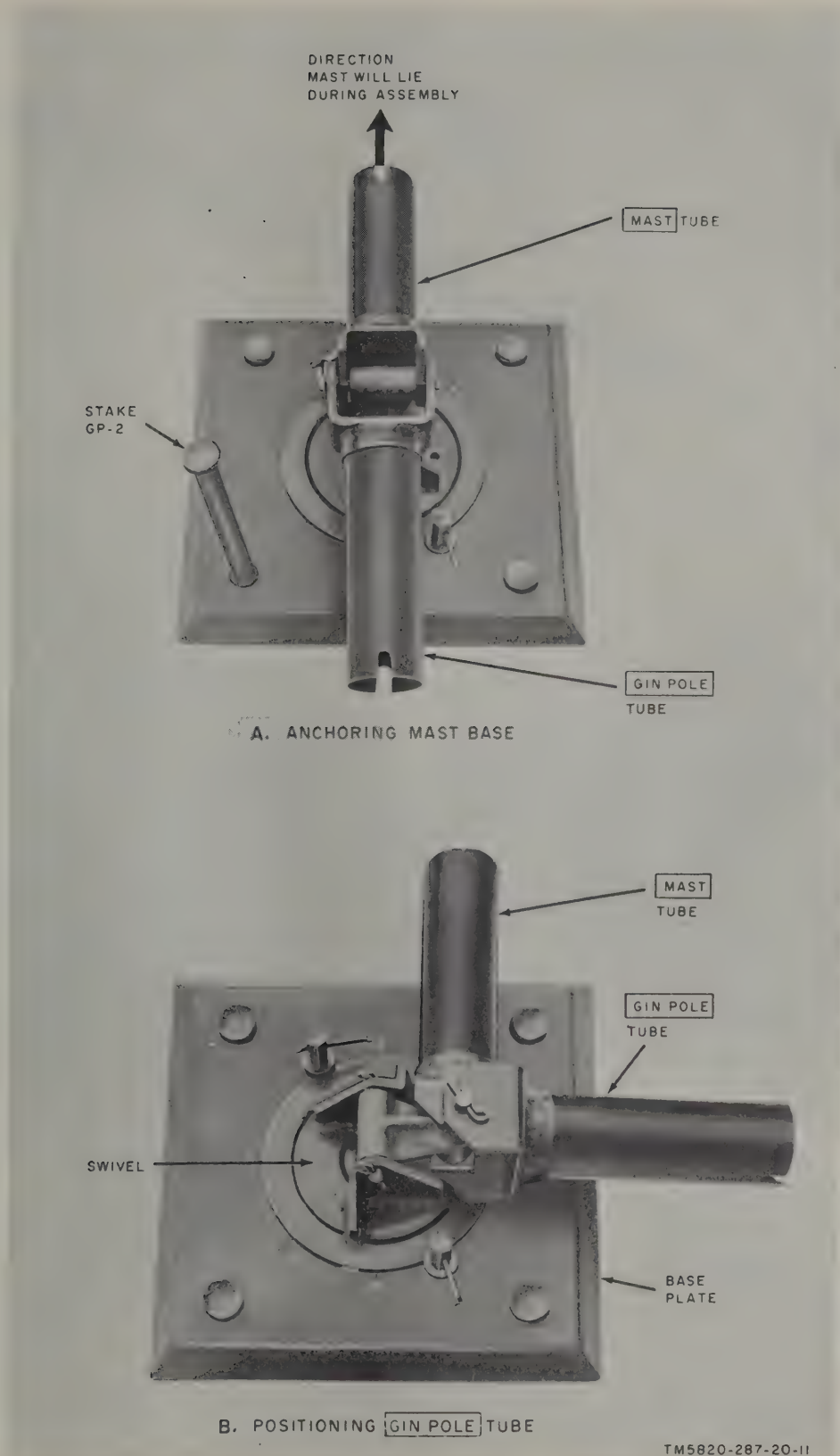
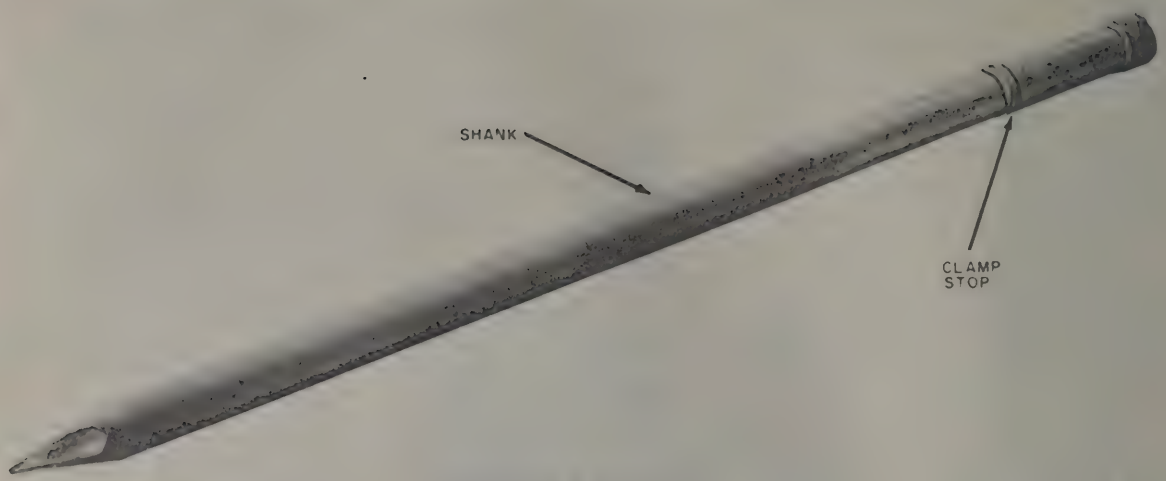
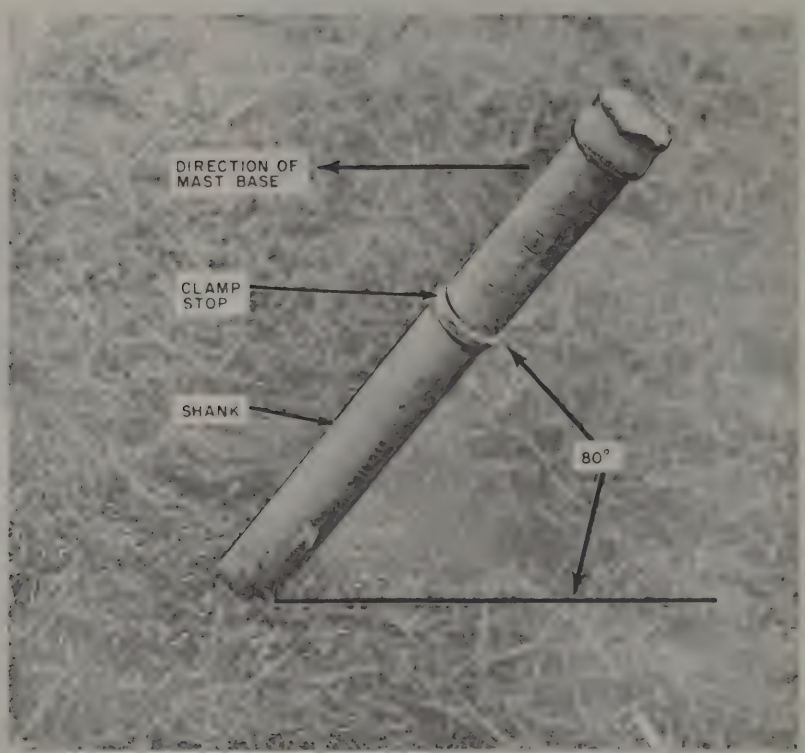


Figure 11. Anchoring of mast base and positioning GIN POLE tube.



A. STAKE, GUY GP-113/G



B. ANCHORING OF STAKE, GUY GP-113/G

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Figure 12. Stake, Guy GP–113/G and method of anchoring.

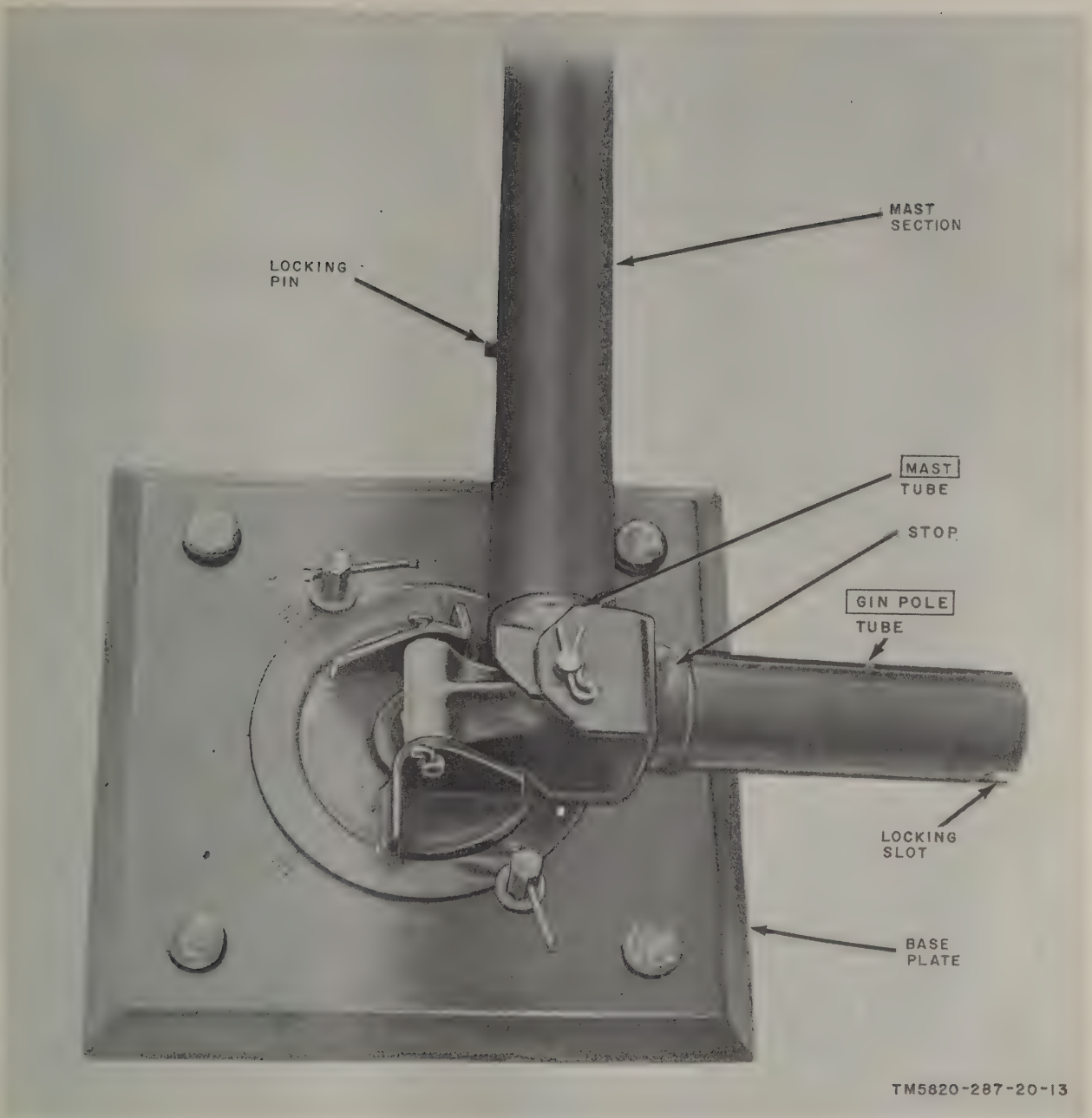


Figure 13. Mast section installed on MAST tube of mast base.

(2) Install a mast section on the MAST tube (fig. 13). Be sure the locking pin on the mast section is in the locking slot of the MAST tube so that the end of the mast section butts against the stop on the MAST tube.

(3) Add two more mast sections to the mast section on the MAST tube. Be sure the locking pin of each mast section is in the locking slot of the mast section on which it mounts so that the end of the mast section butts against the stop on the mast section that it mounts on.

(4) Install a guy plate on the third mast section as shown in figure 14.

(5) Install three more mast sections on the mast sections on the MAST tube. Be sure the locking pin of each mast section is in the locking slot of the mast section as shown in figure 14.

(6) Install two more mast sections on the mast sections on the MAST tube. Be sure the locking pin of each mast sec-

tion is in the locking slot of the mast section on which it mounts.

(7) Install a guy plate on the eighth mast section as shown in figure 14.

(8) Install the remaining mast section on the eighth mast section. Be sure the locking pin of the last mast section is in the locking slot of the eighth mast section.

b. B-, C- or D-Band.

(1) Perform the procedures in *a*(1) through (6) above.

(2) Install the three remaining mast sections on the mast sections on the MAST tube.

(3) Determine whether the antenna will use one or two AT–414/TRC's.

(4) Secure the top guy plate to the appropriate mounting stub with the retaining bolts (fig. 15).,

(5) Install the AB–325/TRC on the ninth mast section.

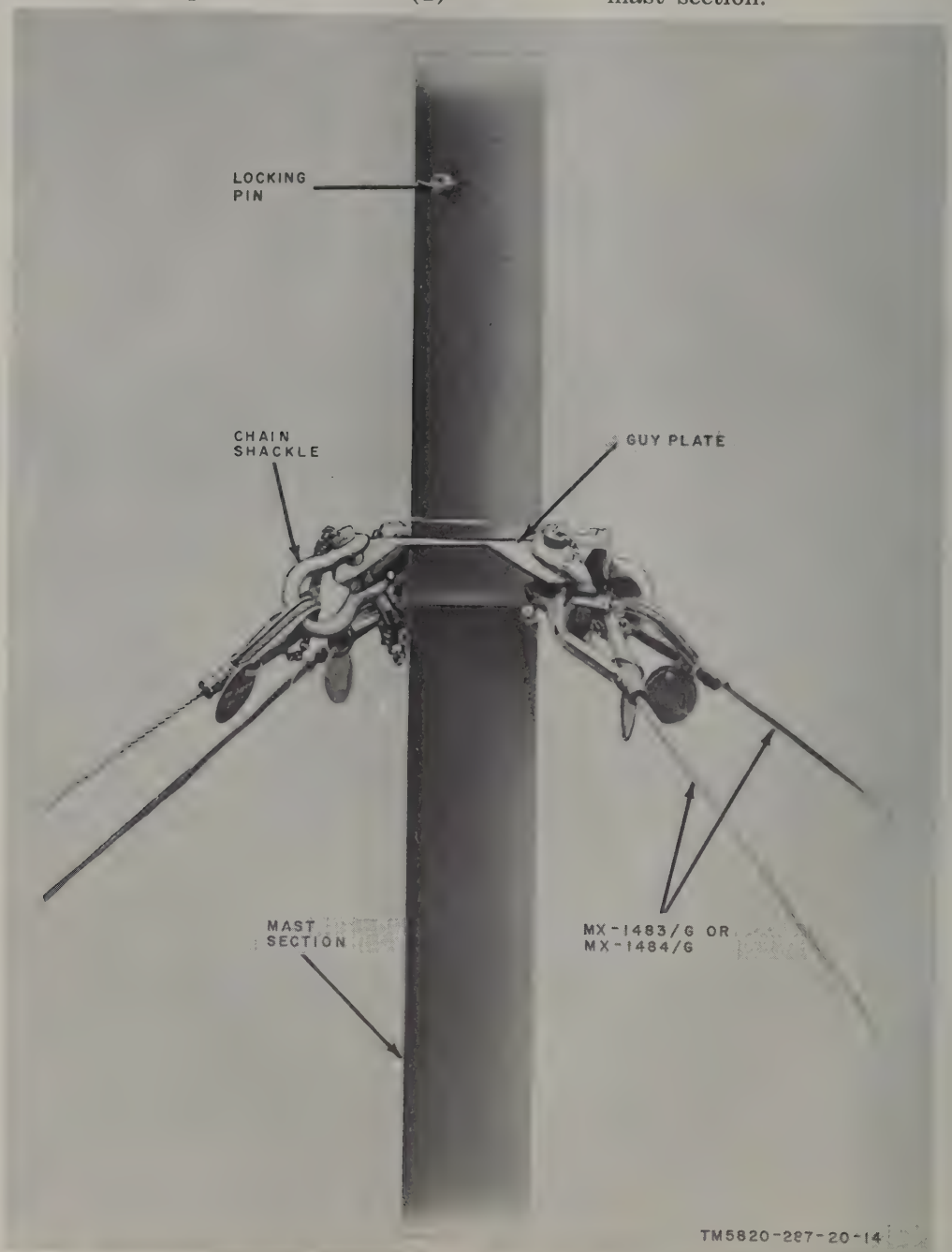


Figure 14. Guy plate installed on mast section with MX–1483/G's or MX–1484/G's attached to guy plate.

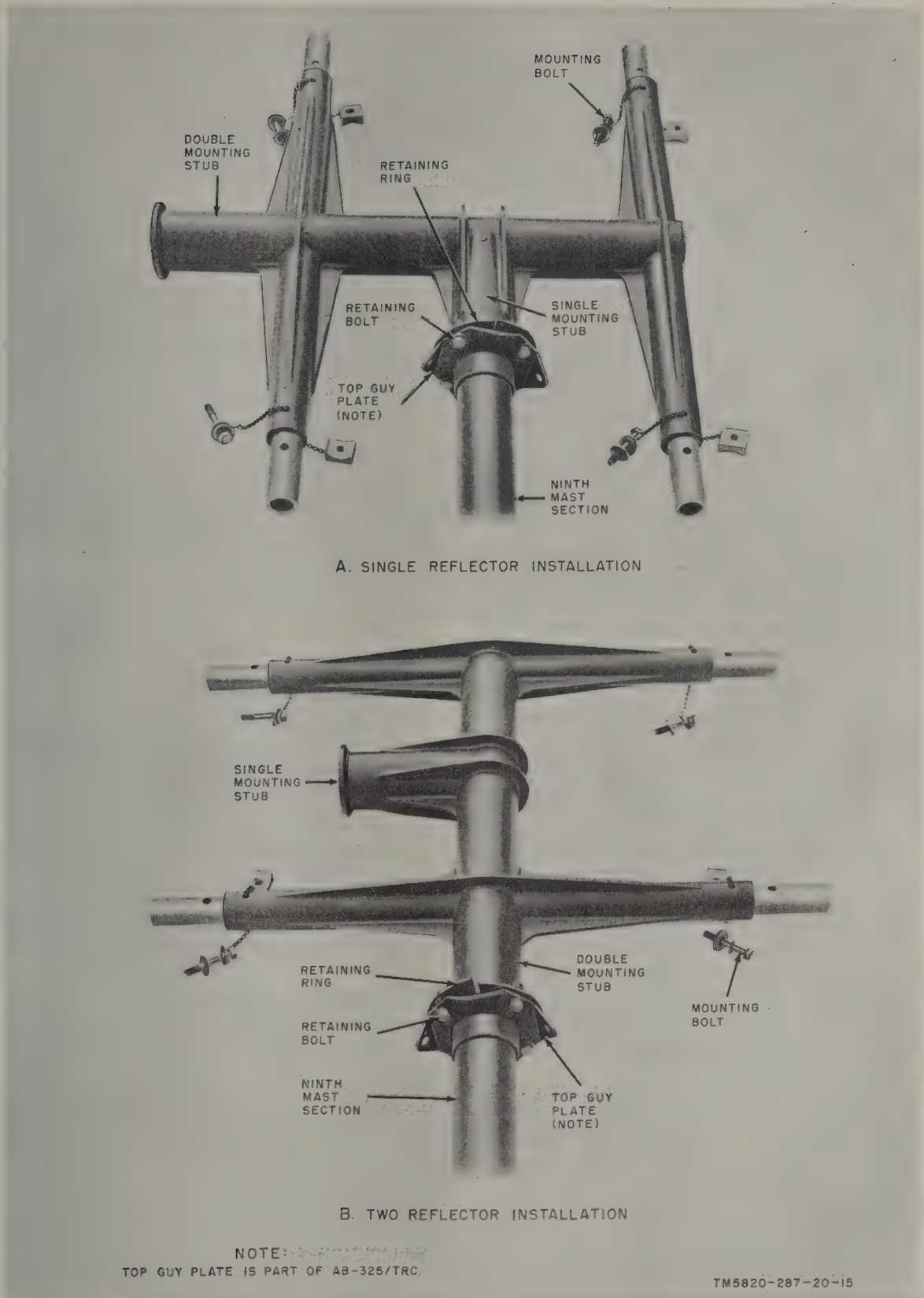


Figure 15. Antenna Reflector Support AB-325/TRC installed on ninth mast section for use with one or two AT-414/TRC's.

(6) Determine the required antenna polarization.

(7) Install the AT–414/TRC on the AB–325/TRC as illustrated in figure 16 or 17.

c. F-Band.

(1) Perform the procedures given in *b* (1) and (2) above.

(2) Install the AB–325/TRC on the ninth mast section of the mast as shown in B, figure 15.

30. Raising and Securing Gin Pole

a. Refer to figures 14, 18, 19 and 20 and attach the guys, the guy ropes, and the block and tackle assembly. Be careful to avoid crossing the guys. Make the length of the guys attached to stake No. 1 (fig. 18) equal to the length of the equivalent guys attached to stakes No. 2 and 4. Make the length of guy rope No. 1 equal to the length of the mast.

***Caution:* Be sure the MX–1884/G attached to the gin pole is taut and the MX–1483/G's attached to the gin pole, are slightly loose. This will cause the mast to bow slightly when it is being raised and prevent it from toppling over.**

b. Raise the gin pole to a vertical position.

c. Attach guy rope No. 2 to guy stake No. 4 as shown in figure 21.

d. Pull the free end of the block and tackle assembly and raise the mast until it is approximately 3 feet above the ground.

e. Install the antenna mast cradle of Antenna Group OA–1389/GRC under the ninth mast section as shown in figure 21 and allow the mast to rest on the antenna mast cradle.

Note. When the A-band antenna is to be installed on the mast (para 31), use the antenna mast stand of Antenna Filter Group OA–1391/GRC instead of the antenna mast cradle of Antenna Group OA–1389/GRC.

31. Assembly and Installation of A-Band Antenna

a. Determine the type of polarization and the radiofrequency (rf) channel number or frequency required.

b. Refer to figure 22 and assemble the A-band antenna.

c. Install the mast head casting with the attached A-band antenna on the ninth mast section of the mast. Be sure the directors are facing toward the sky.

d. Determine whether the A-band antenna is to be single-stacked or double-stacked.

e. Follow the procedures given in (1) below to connect the A-band antenna for single-stacked operation. Follow the procedures given in (2) below to connect the A-band antenna for double-stacked operation.

(1) *Single-stacked operation.*

(*a*) Connect a CG–1030/U to the transmitting section of the antenna (A, fig. 23) and a CG–1030/U to the receiving section of the antenna.

(*b*) Secure the CG–1030/U's to the upper guy plate with the electrical clamps as shown in A, figure 23.

(2) *Double-stacked operation.*

(*a*) Obtain the items listed in the chart below.

Quantity	Item	Federal stock No.
2	UG–710A/U	5935–201–7870
4	UG–573A/U	5935–201–7906
2	UG–572/U	5935–295–5357
1	UG–566A/U	5935–636–8411
7 feet	RG–11A/U	5935–201–7870
5 feet	RG–133/U	None available

(*b*) Refer to C, figure 23 and make a ┬-harness for the A-band antenna.

(*c*) Connect the ┬-harness as shown in B, figure 23.

(*d*) Connect a UG–643/U to the ┬-harness.

(*e*) Connect a CG–1030/U to the UG–643/U.

(*f*) Secure the CG–1030/U to the upper guy plate with the electrical clamp as shown in B, figure 23.

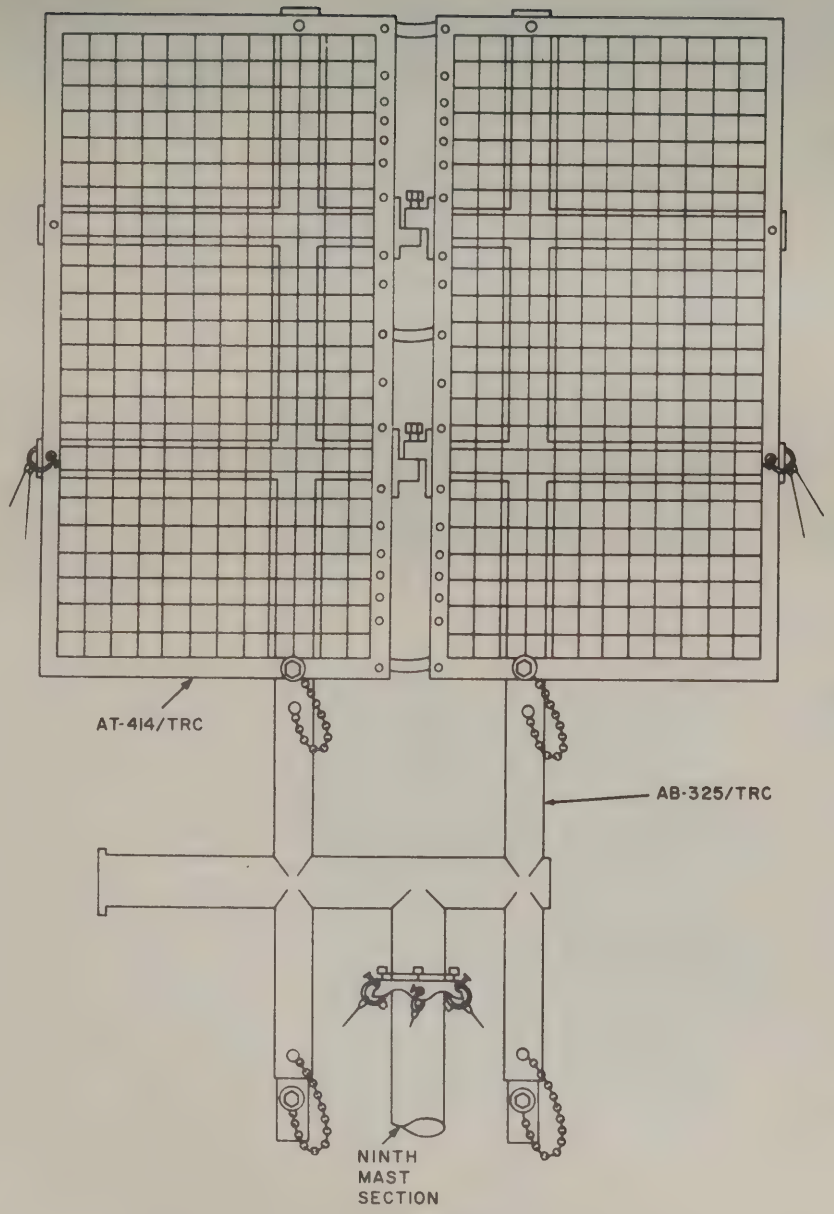
32. Assembly and Installation of B-Band Antenna

a. Determine the rf channel number or frequency required.

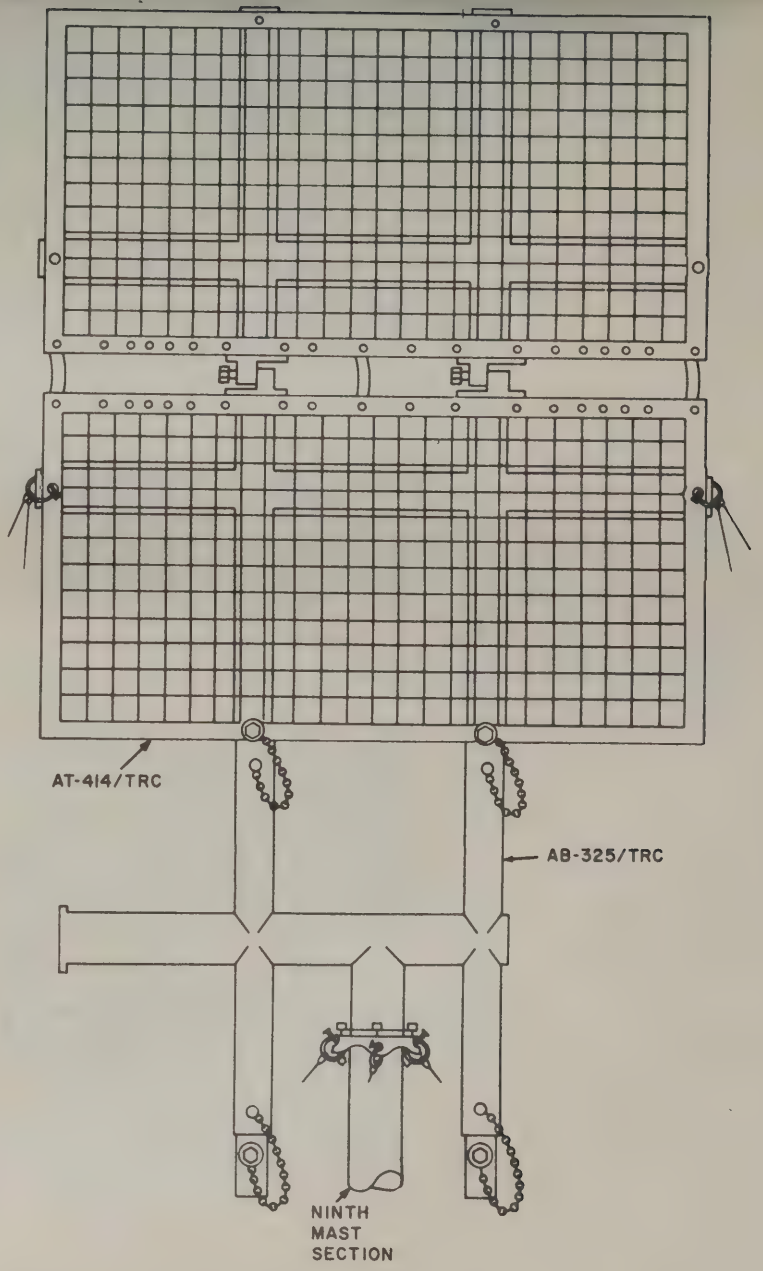
b. Refer to figure 24 and assemble the B-band element assemblies on the AT–414/TRC. Be sure that the element assemblies are facing toward the sky.

c. Refer to figure 25 to connect the CG–1042/U and CG–1030/U to the transmitting and receiving sections of a B-band antenna when using two reflectors.

Note. When one reflector is used, one antenna assembly is required for the receiving antenna and one



A. HORIZONTAL POLARIZATION



B. VERTICAL POLARIZATION

Figure 16. Antenna Reflector AT-414/TRC installed on AB-325/TRC for horizontal or vertical polarization.

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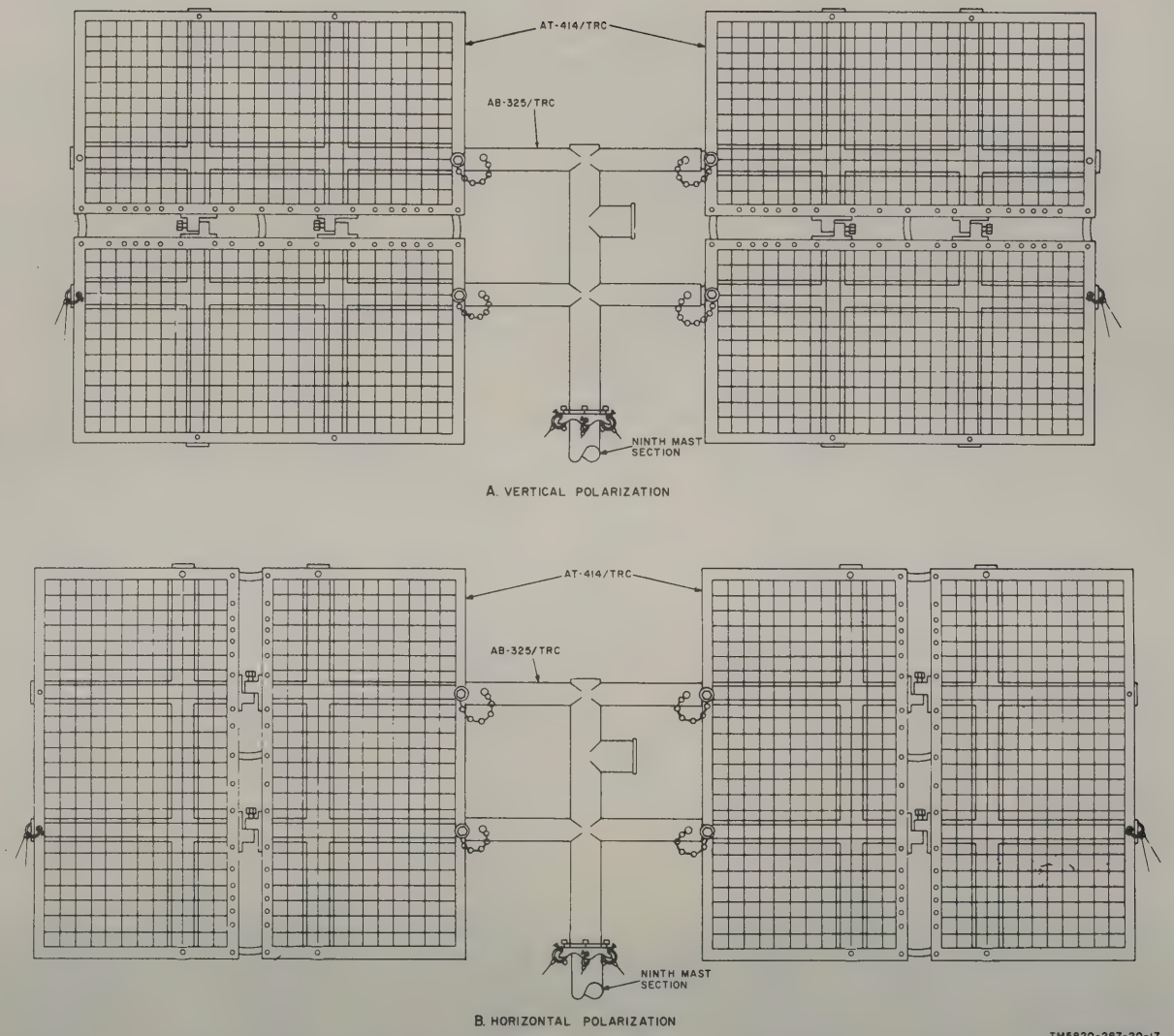


Figure 17. Two Antenna Reflector AT–414/TRC's installed on AB–325/TRC for horizontal or vertical polarization.

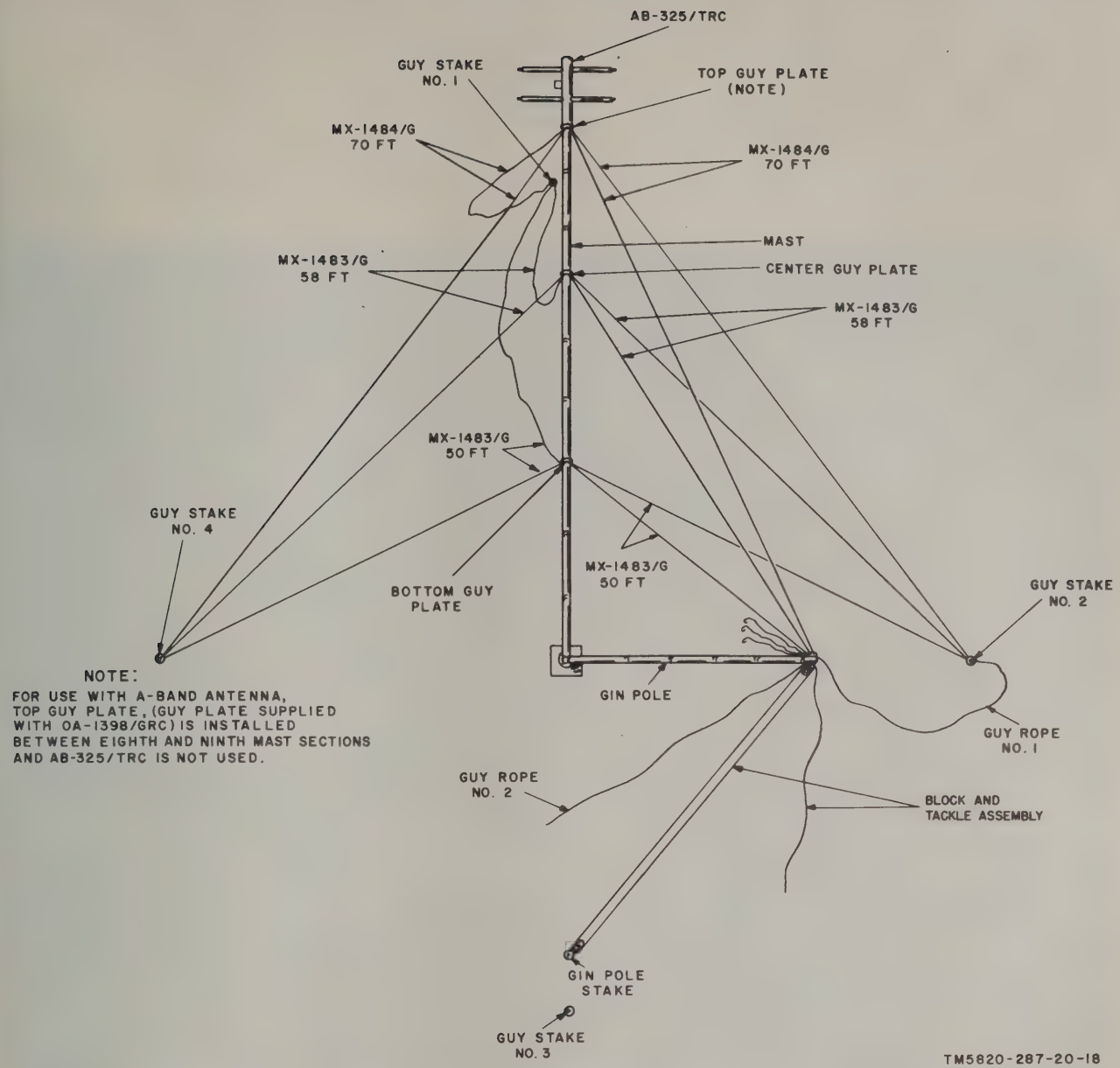

AB-325/TRC
GUY STAKE NO. 1
TOP GUY PLATE (NOTE)
MX-1484/G 70 FT
MX-1484/G 70 FT
MAST
MX-1483/G 58 FT
CENTER GUY PLATE
MX-1483/G 58 FT
MX-1483/G 50 FT
GUY STAKE NO. 4
MX-1483/G 50 FT
BOTTOM GUY PLATE
GUY STAKE NO. 2
GIN POLE
GUY ROPE NO. 1
GUY ROPE NO. 2
BLOCK AND TACKLE ASSEMBLY
GIN POLE STAKE
GUY STAKE NO. 3
NOTE:
FOR USE WITH A-BAND ANTENNA, TOP GUY PLATE, (GUY PLATE SUPPLIED WITH OA-1398/GRC) IS INSTALLED BETWEEN EIGHTH AND NINTH MAST SECTIONS AND AB-325/TRC IS NOT USED.
TM5820-287-20-18

Figure 18. Mast and gin pole lying on ground with guys, guy ropes, and block and tackle assembly attached.

antenna assembly for the transmitting antenna. Connect the CG–1042/U and CG–1030/U as shown in the receiving section or transmitting section for a B-band antenna when using one reflector.

d. Connect the MX–1483/G's with the chain shackles to the AT–414/TRC as shown in figure 25.

33. Assembly and Installation of C-Band Antenna

a. Determine the rf channel number or frequency required.

b. Refer to figure 26 and assemble the C-band element assemblies on the AT–414/TRC. Be sure the element assemblies are facing toward the sky.

c. Refer to figure 25 to connect the CG–1042/U and CG–1030/U to the transmitting and receiving sections of a C-band antenna when using two reflectors.

Note. When one reflector is used, one antenna assembly is required for the receiving antenna and one antenna assembly for the transmitting antenna. Connect the CG–1042/U and CG–1030/U as shown on the receiving section or transmitting section for a C-band antenna when using one reflector.

d. Connect the MX–1483/G's (75 ft) with the chain shackles to the AT–414/TRC as shown in figure 25.

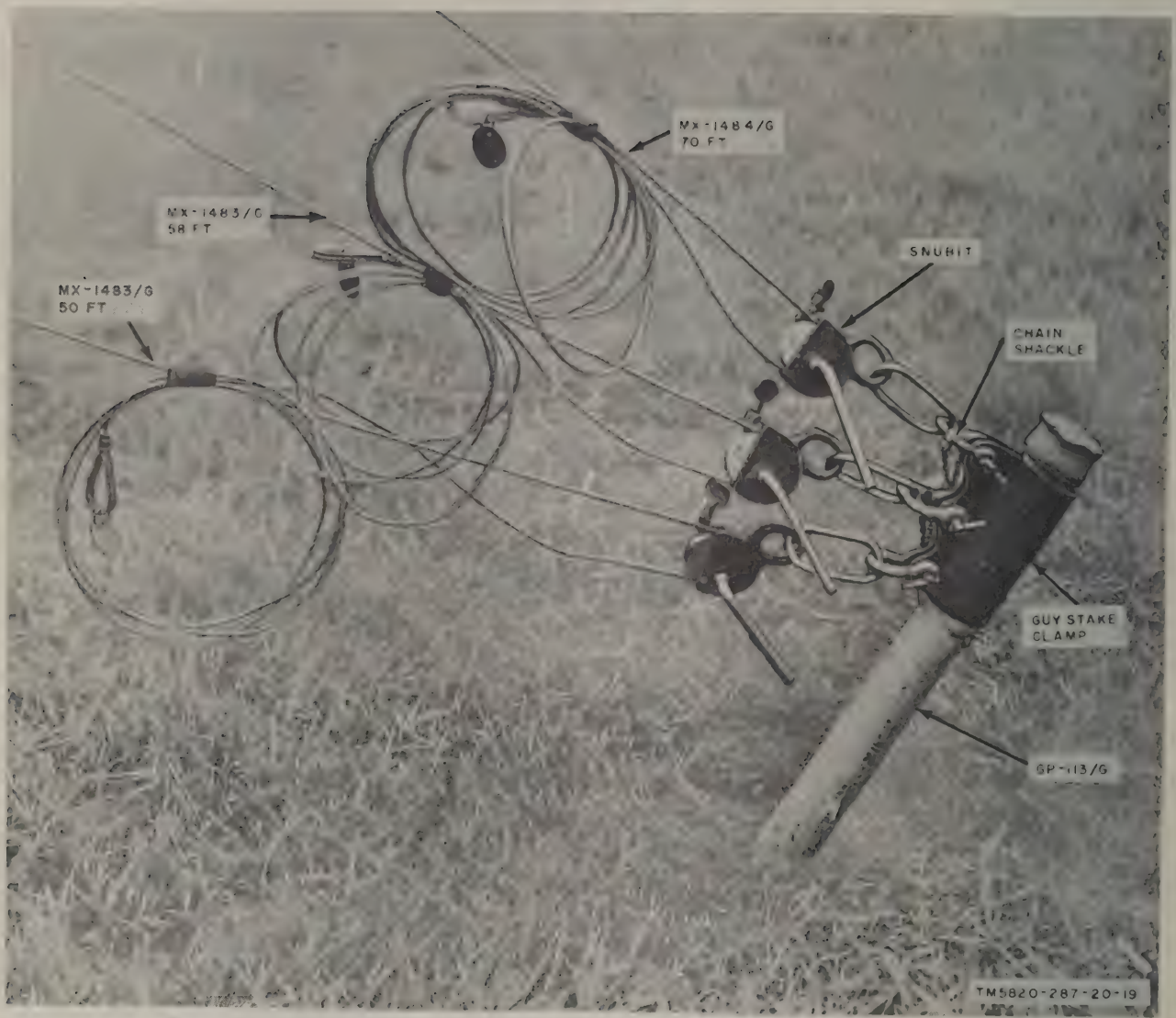


Figure 19. Guy stake anchored in ground with guy stake clamp and guys attached.

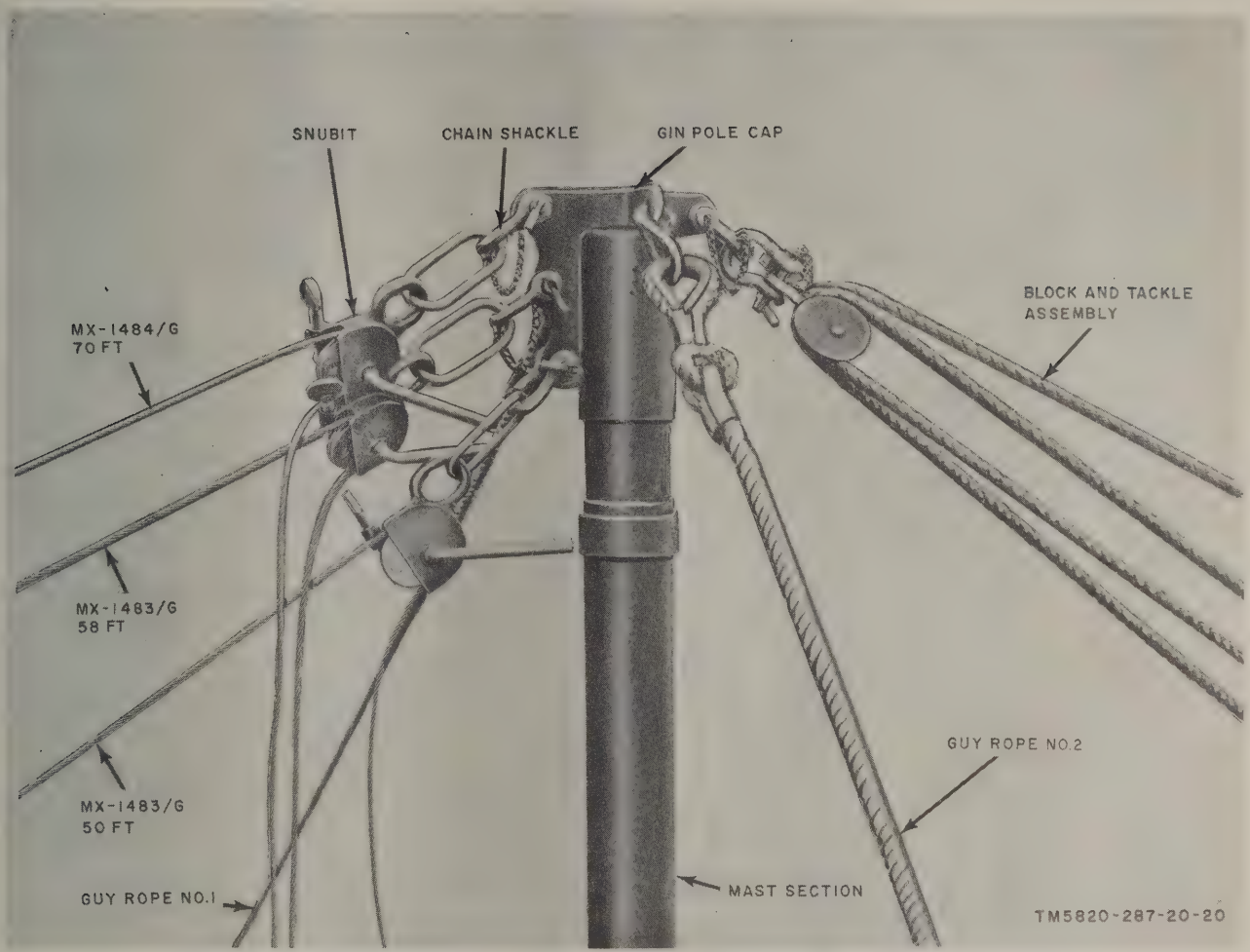


Figure 20. Gin pole cap mounted on mast section of gin pole with guys, guy ropes, and block and tackle assembly attached.

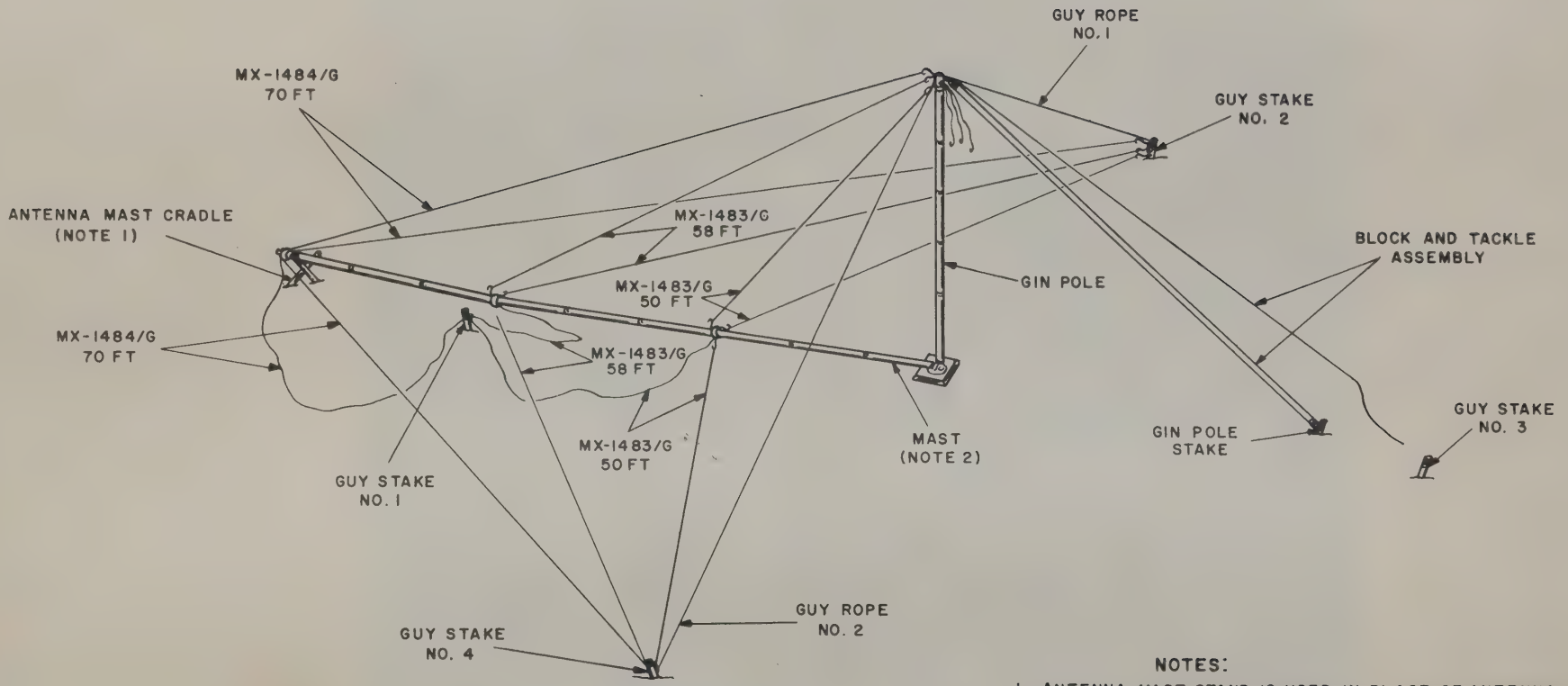
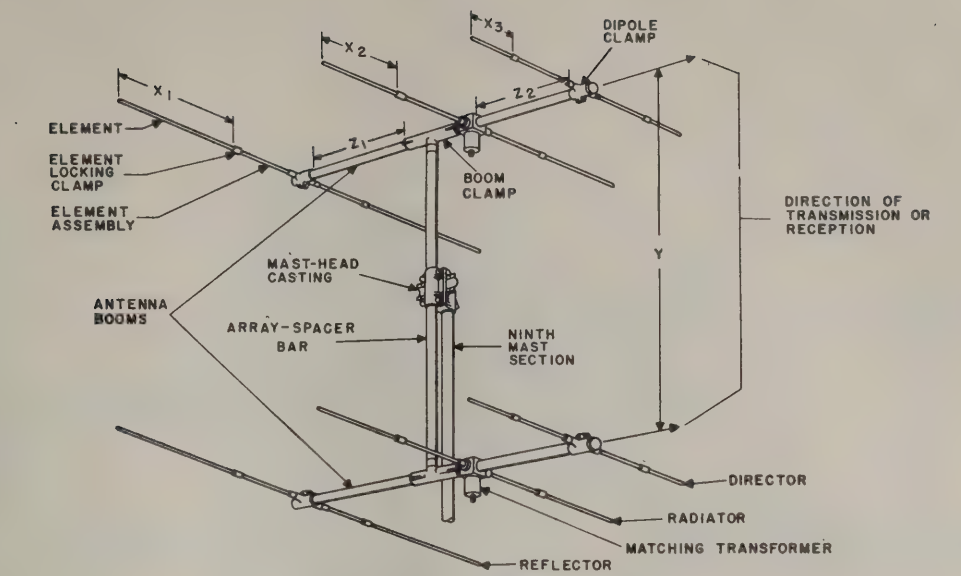
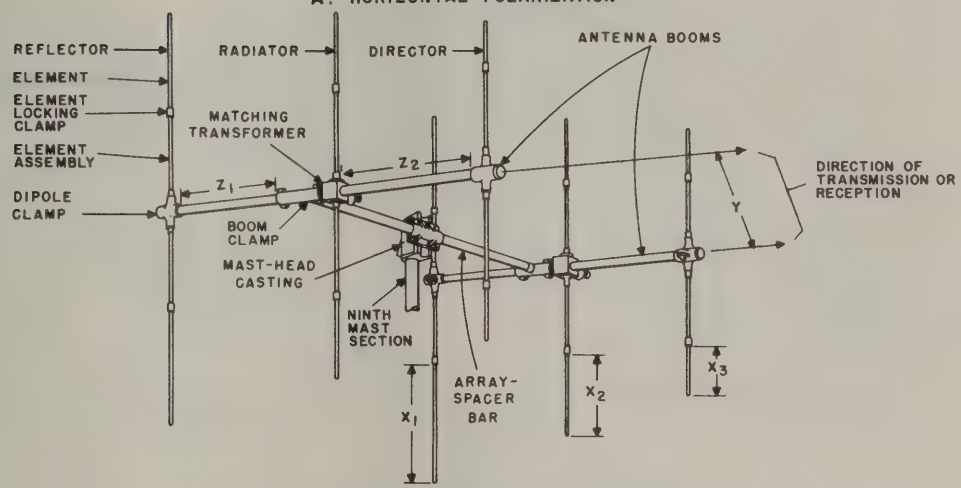


Figure 21. Gin pole raised and secured in vertical position with mast lying on antenna mast cradle.



A. HORIZONTAL POLARIZATION



B. VERTICAL POLARIZATION

RF CHANNEL NUMBER	RF CHANNEL FREQUENCY (MC)	ELEMENT SETTING			DIPOLE CLAMP AND ARRAY-SPACER BAR SETTING
		X_1	X_2	X_3	Y, Z_1 AND Z_2
1 THROUGH 16	50 TO 54	60-3/4	56-1/4	49-1/4	A1 - A16
17 THROUGH 32	54 TO 58	56-1/2	52-1/4	45-3/4	A17 - A32
33 THROUGH 48	58 TO 62	52	48-1/4	42-1/4	A33 - A48
49 THROUGH 72	62 TO 67	48-3/4	45	39-1/2	A49 - A72
73 THROUGH 88	67 TO 72	44-1/2	41-1/4	36	A73 - A88
89 THROUGH 108	72 TO 77	41-1/4	38-1/4	33-1/2	A89 - A108
109 THROUGH 128	77 TO 82	39	36	31-1/2	A109 - A128
129 THROUGH 152	82 TO 88	36-1/2	33-3/4	29-1/2	A129 - A152
153 THROUGH 176	88 TO 94	34-1/4	31-3/4	27-3/4	A153 - A176
177 THROUGH 200	94 TO 100	32-1/4	29-3/4	26	A177 - A200

C. ELEMENT, DIPOLE CLAMP, AND ARRAY-SPACER BAR SETTING CHART.

NOTES:

1. ELEMENT SETTINGS (X_1 THROUGH X_3) ARE MARKED ON ELEMENTS.
2. DIPOLE CLAMP SETTINGS (Z_1 AND Z_2) ARE MARKED ON ANTENNA BOOM.
3. ARRAY-SPACER BAR SETTINGS (Y) ARE MARKED ON ARRAY-SPACER BAR.

TM5820-287-20-22

Figure 22. A-band antenna assembled and installed on ninth section of mast for vertical polarization and for horizontal polarization with chart for antenna settings for various frequencies.

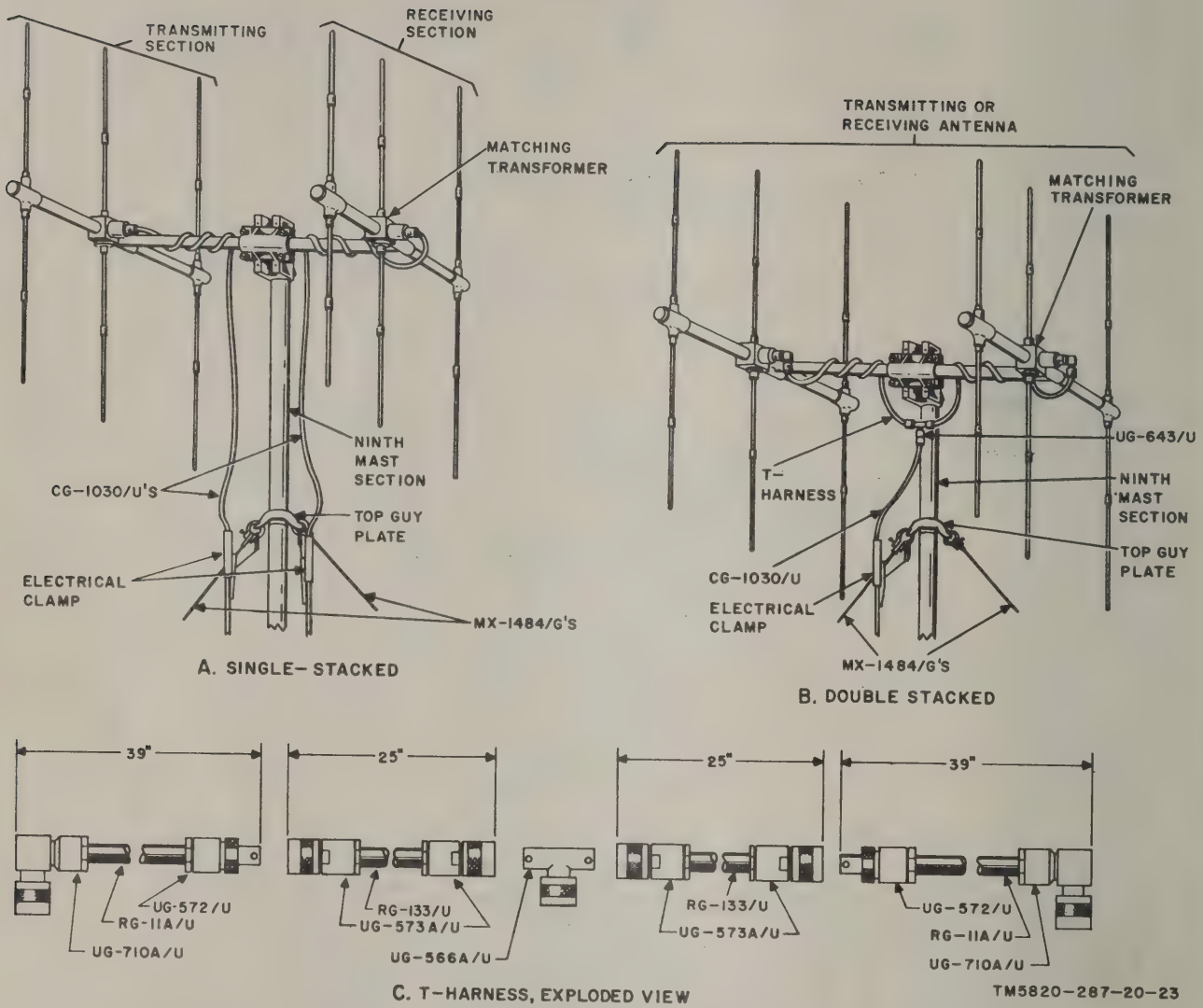
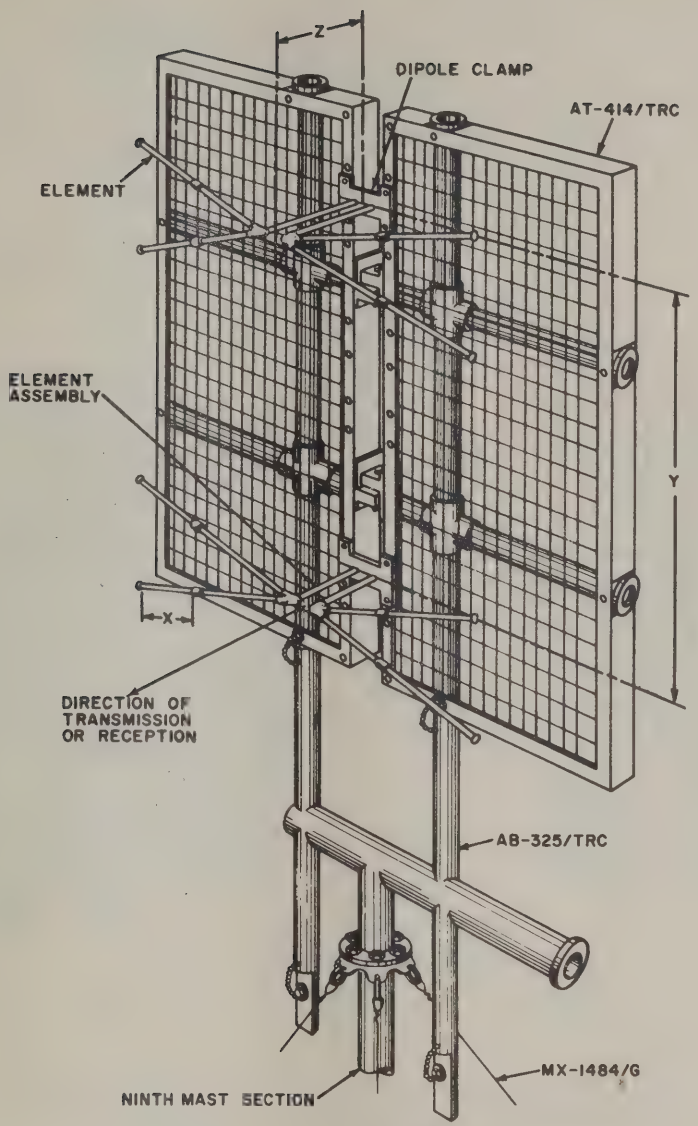


Figure 23. A-band antenna connected for single-stacked operation and double-stacked operation with exploded view of T-harness.



NOTES:

1. ELEMENT, ELEMENT ASSEMBLY, AND DIPOLE CLAMP SETTINGS ARE AS FOLLOWS:

RF CHANNEL NUMBER	RF CHANNEL FREQUENCY (MC)	SETTING X, Y, AND Z
1 THROUGH 71	100 TO 135	B1-B71
72 THROUGH 170	135 TO 185	B72-B170
171 THROUGH 250	185 TO 225	B171-B250

2. ELEMENT SETTINGS X ARE MARKED ON ELEMENT.
3. ELEMENT ASSEMBLY SETTINGS Z ARE MARKED ON ELEMENT ASSEMBLY.
4. DIPOLE CLAMP SETTINGS Y ARE ON REFLECTOR.

TM5820-287-20-24

Figure 24. B-band antenna assembled and installed on ninth section of mast for horizontal polarization using one AT-414/TRC.

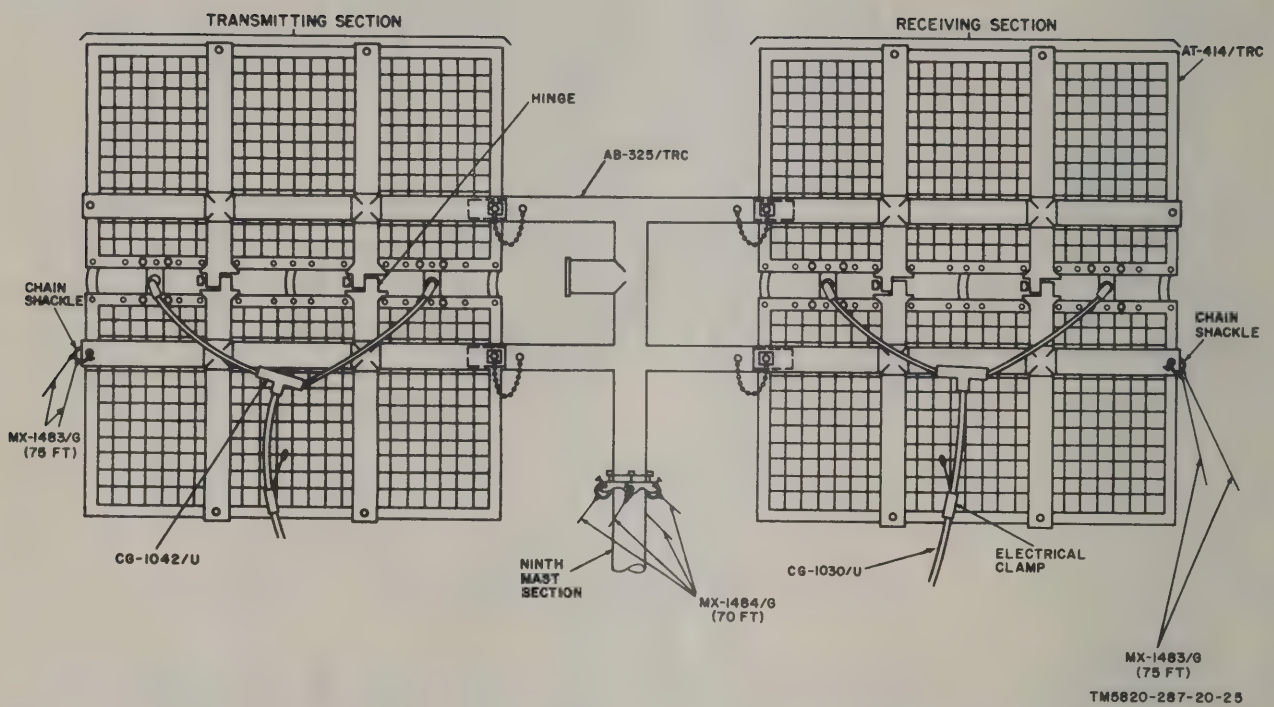
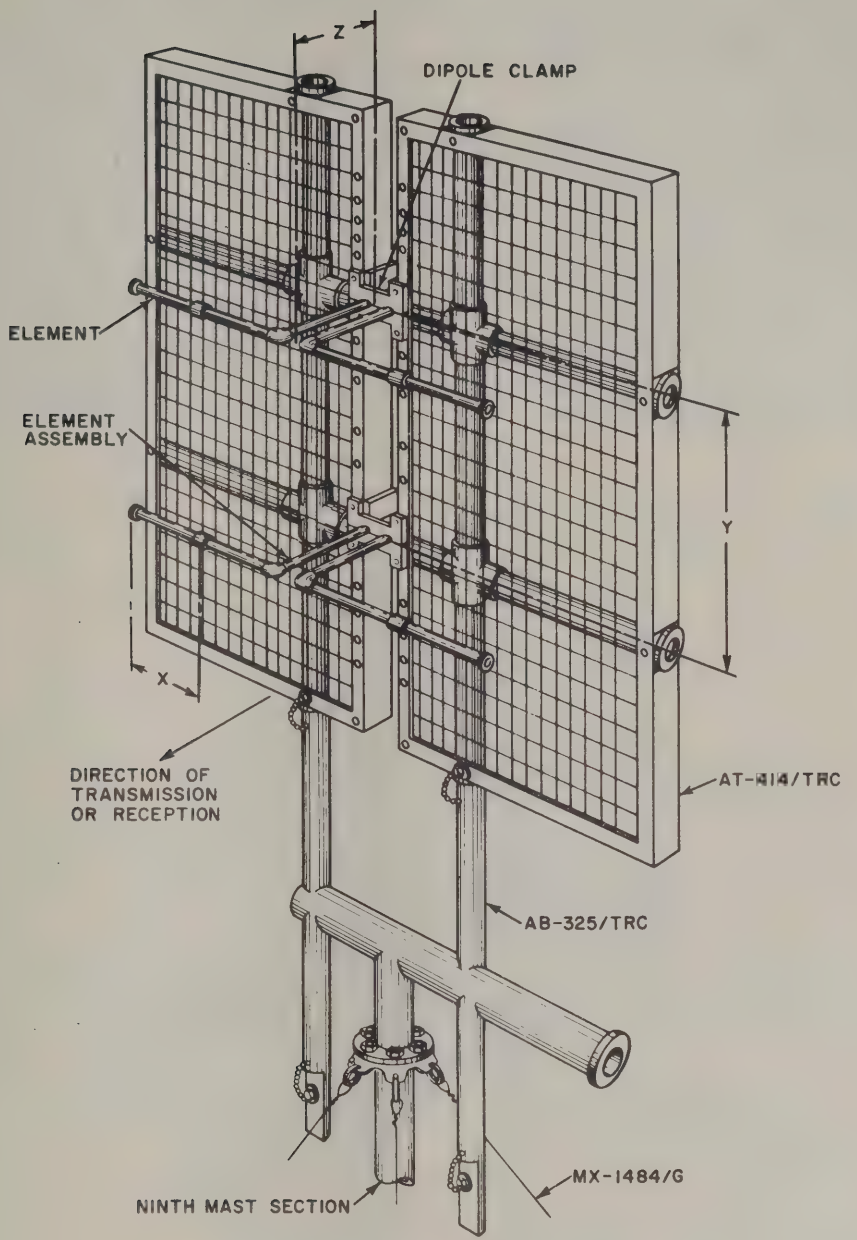


Figure 25. B-band or C-band antenna using two AT–414/TRC's, rear view showing CG–1042/U and CG–1030/U connections.



NOTES:

1. ELEMENT, ELEMENT ASSEMBLY, AND DIPOLE CLAMP SETTINGS ARE AS FOLLOWS:

RF CHANNEL NUMBER	RF CHANNEL FREQUENCY (MC)	SETTING X, Y, AND Z
25 THROUGH 120	225 TO 320	C25-C120
121 THROUGH 200	320 TO 400	C121-C200

2. ELEMENT SETTINGS X ARE MARKED ON ELEMENT.
3. ELEMENT ASSEMBLY SETTINGS Z ARE MARKED ON ELEMENT ASSEMBLY.
4. DIPOLE CLAMP SETTINGS Y ARE MARKED ON REFLECTOR.

TM5820-287-20-26

Figure 26. C-band antenna assembled and installed on ninth section of mast for horizontal polarization using one AT-414/TRC.

34. Assembly and Installation of D-Band Antenna

a. Refer to figure 27 and assemble the D-band element assemblies on the AT–414/TRC. Be sure the element assemblies are facing toward the sky.

b. Refer to figure 28 to connect the CG–1370/U, CG–1544/U, and CG–1030/U to the transmitting and receiving section of a D-band antenna when using two reflectors.

Note. When one reflector is used, one antenna assembly is required for the receiving antenna and one antenna assembly for the transmitting antenna. Connect the CG–1370/U, CG–1544/U, and CG–1030/U as shown in the receiving section or transmitting section for a D-band antenna when using one reflector.

c. Connect the MX–1483/G's (75 ft) with the chain shackles to the AT–414/TRC's as shown in figure 28.

35. Assembly and Installation of F-Band Antennas

(fig. 29)

a. Install the AS–1083/TRA–25's on the AB–325/TRC. Be sure that the covered portions of the AS–1083/TRA–25's are facing toward the sky.

b. Connect the CG–1886/U to the transmitting section and the receiving section as shown.

c. Connect the MX–1483/G's (75 ft) with the chain shackles to the AS–1083/TRA–25's.

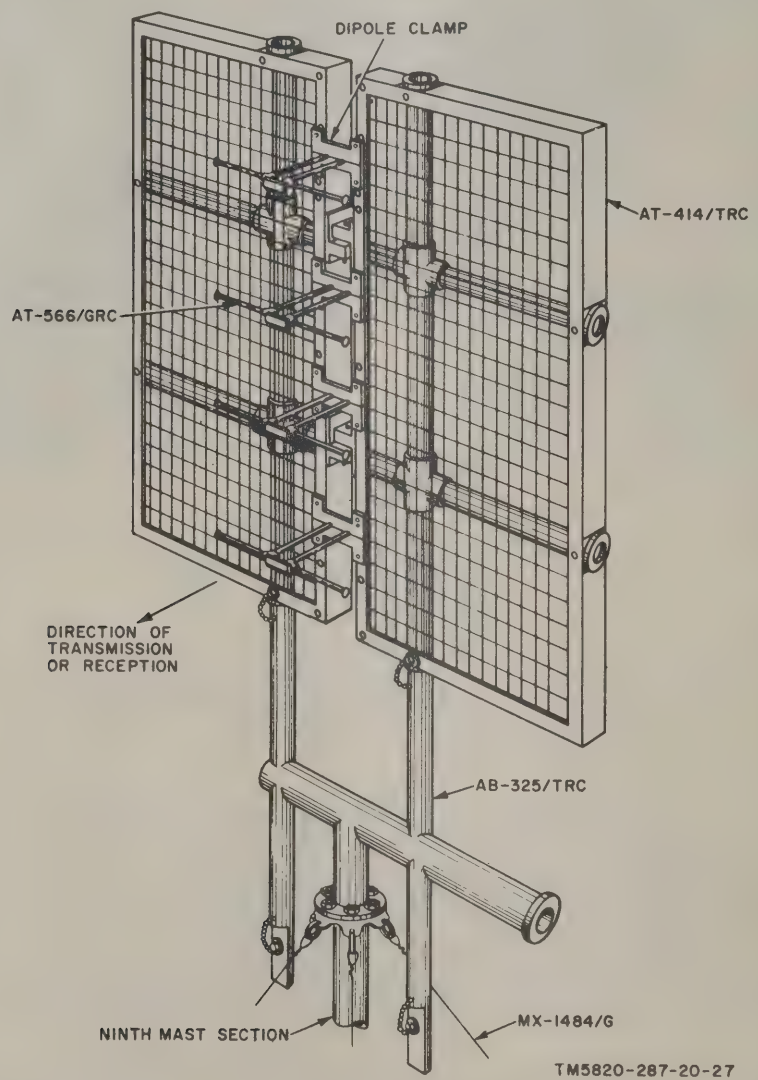


Figure 27 D-band antenna assembled and installed on ninth section of mast for horizontal polarization using one AT–414/TRC.

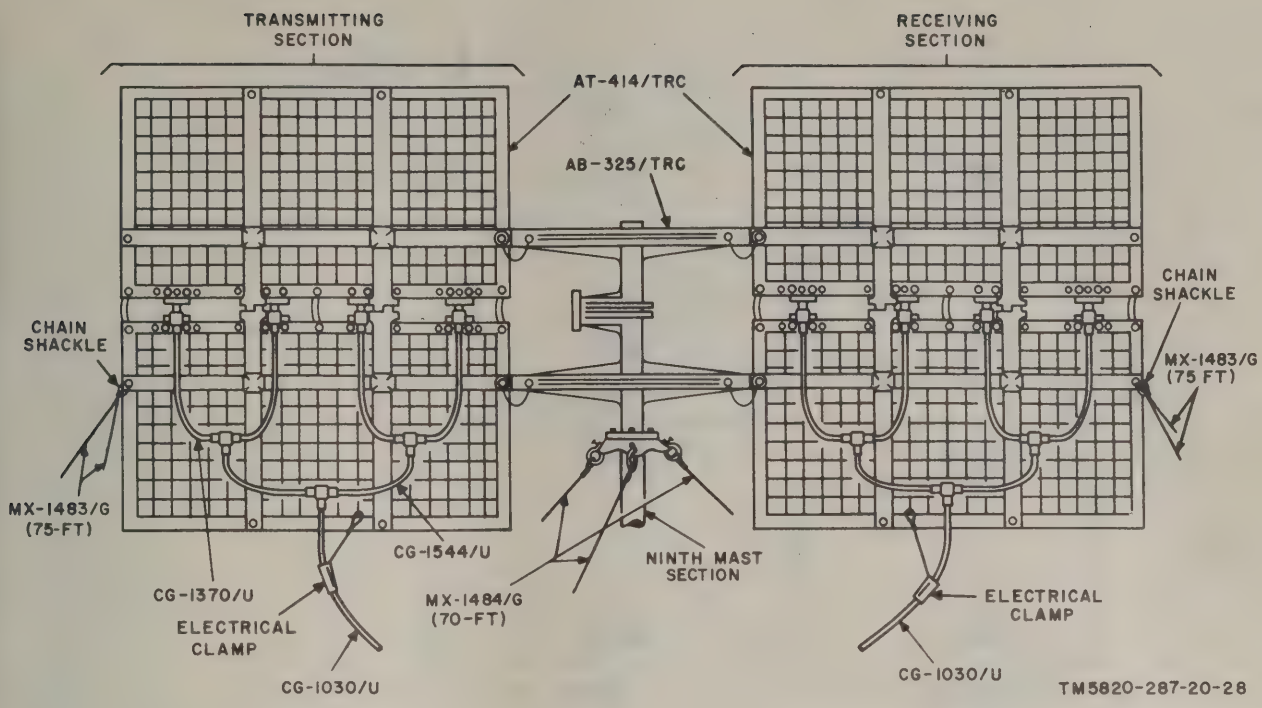


Figure 28. D-band antenna using two AT–414/TRC's, rear view showing CG–1370/U, CG–1544/U, and CG–1030/U connections.

36. Erecting and Securing Antenna Assembly

a. Attach an electrical clamp to each CG–1030/U (CG–1886/U, F-band) and attach the electrical clamps to the center guy plate (fig. 18).

Caution: **To avoid unnecessary power loss, be sure there are no kinks or bends in the CG–1030/U's and that each CG–1030/U is secured on opposite sides of the mast.**

b. Check all guys, guy ropes, and the block and tackle assembly to see that they are properly secured.

c. Check to be sure the mast is slightly bowed (fig. 21).

d. Be sure that one end of each MX–1483/G (75 ft) is properly secured (fig. 25, 28, or 29) and the other end is free.

Warning: **Before performing the procedure given in *e* below, station a man at guy stake No. 1 to adjust the guys. This will prevent the mast from toppling over on the man using the block and tackle assembly.**

e. Pull the free end of the block and tackle assembly to raise the antenna assembly as shown in figure 30.

f. When the antenna assembly is in the upright position, remove the guys (one at a time) from the gin pole cap (fig. 20) and secure them to the guy stake clamp on guy stake No. 3 as shown in figure 19.

g. Tighten all guys except the MX–1483/G (75 ft) to secure the antenna assembly in the upright position.

h. Remove guy ropes No. 1 and No. 2 (fig. 20), the block and tackle assembly, and the gin pole cap.

i. Coil the loose ends of the guys and tape them to the taut sections of the guys as shown in figure 19.

Section II. RADIO AND POWER COMPONENTS

37. Locating

Locate the radio components (R–417(*)/TRC, T–302(*)/TRC, PP–685(*)/TRC, TF–167/TRC, ME–82/U, and J–532/U) as described in *a* below. Locate the power components (PU–286/G and SA–331/U) as described in *b* below.

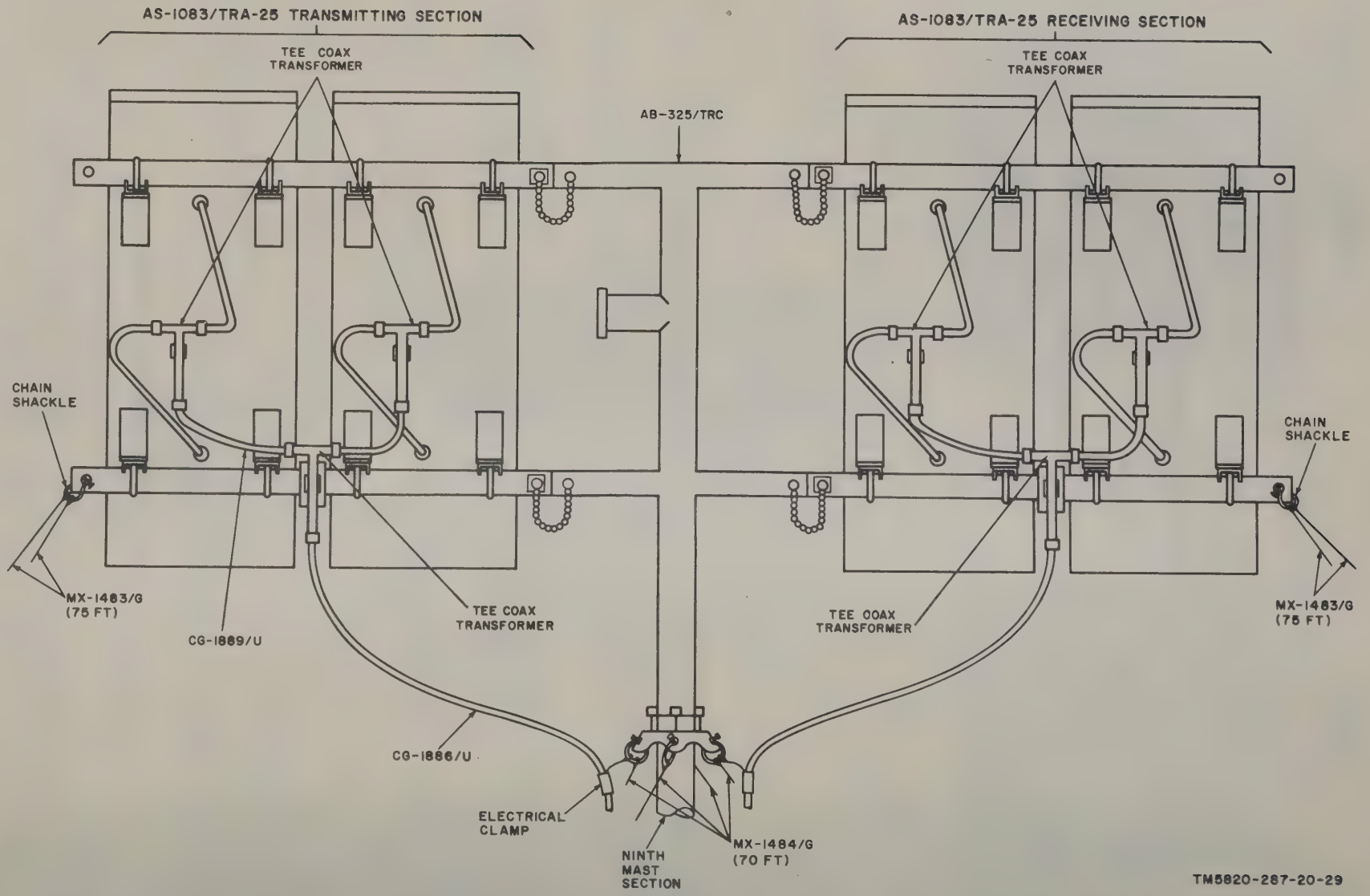


Figure 29. F-band antenna assembled and installed on ninth section of mast for horizontal polarization.

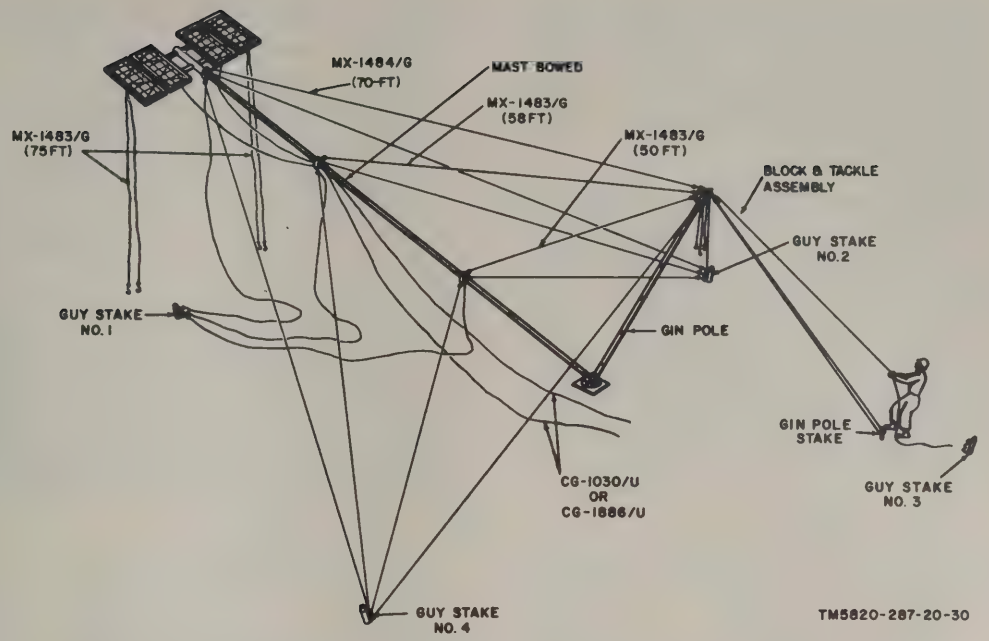


Figure 30. Raising antenna assembly by use of block and tackle assembly.

a. Radio Components.

(1) Locate the radio components as close as possible to the antenna assembly.
(2) Limit the CG–1030/U's (CG–1886/U, F-band) to 80-foot lengths.
(3) Place the radio components in a shelter or in a sheltered location.
(4) Provide a dry, secure, vibration-free footing that will safely support the components in a level position.
(5) If the radio components of a radio repeater set are located in the same enclosure, allow sufficient room to minimize interference.
(6) Provide sufficient space for operating and maintaining the radio components.
(7) Provide adequate lighting and ventilation.

b. Power Components.

(1) Locate the PU–286/G's and the SA–331/U as far away from the radio components (*a* above) and the receiving antenna as the power cord will permit (approximately 150 feet).
(2) Locate the PU–286/G's on firm dry ground.
(3) In dry areas, locate the PU–286/G's in a trench to muffle the noise.
(4) If the PU–286/G's are operated within a building, make sure the exhaust fumes are carried away from the operating personnel.

Warning:* Exhaust fumes contain carbon monoxide which is tasteless, odorless, and a *deadly poison.

38. Installing

a. Radio Components. A typical installation of the radio components is shown in figure 31. Since installation of the radio components will vary with the location (para 37*a*) and the available space, adapt the following instructions to the prevailing situation.

(1) Remove the covers from the carrying cases of the radio components.

***Caution:* Use a screwdriver or pliers to release the catches on the carrying cases. Painful hand injuries may result without the use of tools.**

(2) Stack the radio components on a solid support (table, bench, or shelf). The arrangement of the equipment is flexible, but limited by the lengths of the interconnecting cables (para 39).
(3) Secure each carrying case to the one below it with the carrying straps on the sides of each case.
(4) Pull out the vibration mount (A, fig. 41) of the T–302(*)/TRC.

***Caution:* Do not move the T–302-**

(*)/TRC unless the vibration mount is pushed in. If the T–302(*)/TRC is moved with the vibration mount pulled out, the components in the exciter chassis of the T–302(*)/TRC may be damaged.

(5) Install the correct tuning head, determined by the desired rf channel frequency (TM 11–5820–187–10), in the R–417(*)/TRC and the T–302(*)/TRC and secure the tuning heads.

(6) Install the correct bandpass filter, determined from the chart below, in the R–417(*)/TRC and the T–302(*)/TRC.

Note. Bandpass filters are not installed for F-band operation.

Band	Rf channel No.	Frequency range (mc)	Bandpass filter
A	1–34	50–58.5	F–238/U
A	34–68	58.5–67	F–239/U
A	68–102	67–75	F–240/U
A	102–136	75–84	F–241/U
A	136–170	84–92.5	F–242/U
A	170–204	92.5–100	F–243/U
B	1–42	100–121	F–192/U
B	43–84	121–142	F–193/U
B	85–126	142–163	F–194/U
B	127–168	163–184	F–195/U
B	169–210	184–205	F–196/U
B	211–250	205–226	F–197/U
C	26–53	223–253	F–199/U
C	54–83	253–283	F–200/U
C	84–113	283–313	F–201/U
C	114–143	313–343	F–202/U
C	144–173	343–373	F–203/U
C	174–200	373–403	F–204/U
D	27–101	400–450	F–233/U
D	101–134	450–500	F–134/U
D	134–167	500–550	F–235/U
D	167–200	550–600	F–236/U

b. Power Components. No special procedures are required for installation of the SA–331/U. Refer to TM 11–940A for detailed instructions on the installation of the PU–286/G's.

39. Connecting

Follow the procedures given in *a* below to connect a radio terminal, and in *b* below to connect a radio repeater. Follow the procedures given in *c* below to drop channels from a radio repeater, and in *d* below to ground the radio terminal or radio repeater.

a. Radio Terminal. Connect the radio terminal for A-, B-, C-, or D-band operation (fig. 32) or F-band operation (fig. 33).

b. Radio Repeater. Connect the radio repeater for A-, B-, C-, or D-band operation (fig. 34) or F-band operation (fig. 33 and 34).

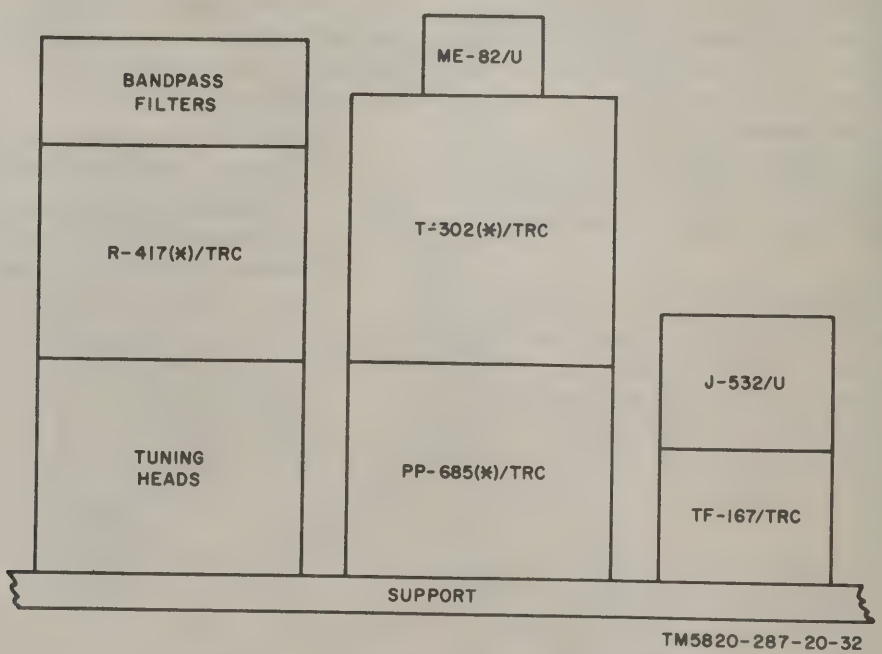


Figure 31. Typical radio component installation.

c. Radio Repeater With Dropped Traffic Channels.

(1) Connect the radio repeater as shown in figure 34 except for connecting the ends of the CX–1512/U's together.

(2) Connect the free ends of the CX–1512/U's to the carrier terminal equipment.

Note. If the carrier terminal equipment is located more than 12 feet away, connect spiral-four cable between the CX–1512/U's and the carrier terminal equipment.

d. Grounding.

(1) Select the lowest dampest area of the site, preferably in clay or loamy soil.

(2) Dig a hole approximately 6 inches deep.

(3) Remove any paint or grease from Ground Rod MX–148/G.

(4) Drive the MX–148/G into the hole until the top of the MX–148/G is approximately 3 inches from the bottom of the hole.

(5) Interconnect the wires from the GND terminals (fig. 32, 33, or 34) and secure the wire to the top of the MX–148/G with Clamp TM–106.

(6) Saturate the ground around the MX–148/G with water. Keep the ground around the MX–148/G moist at all times.

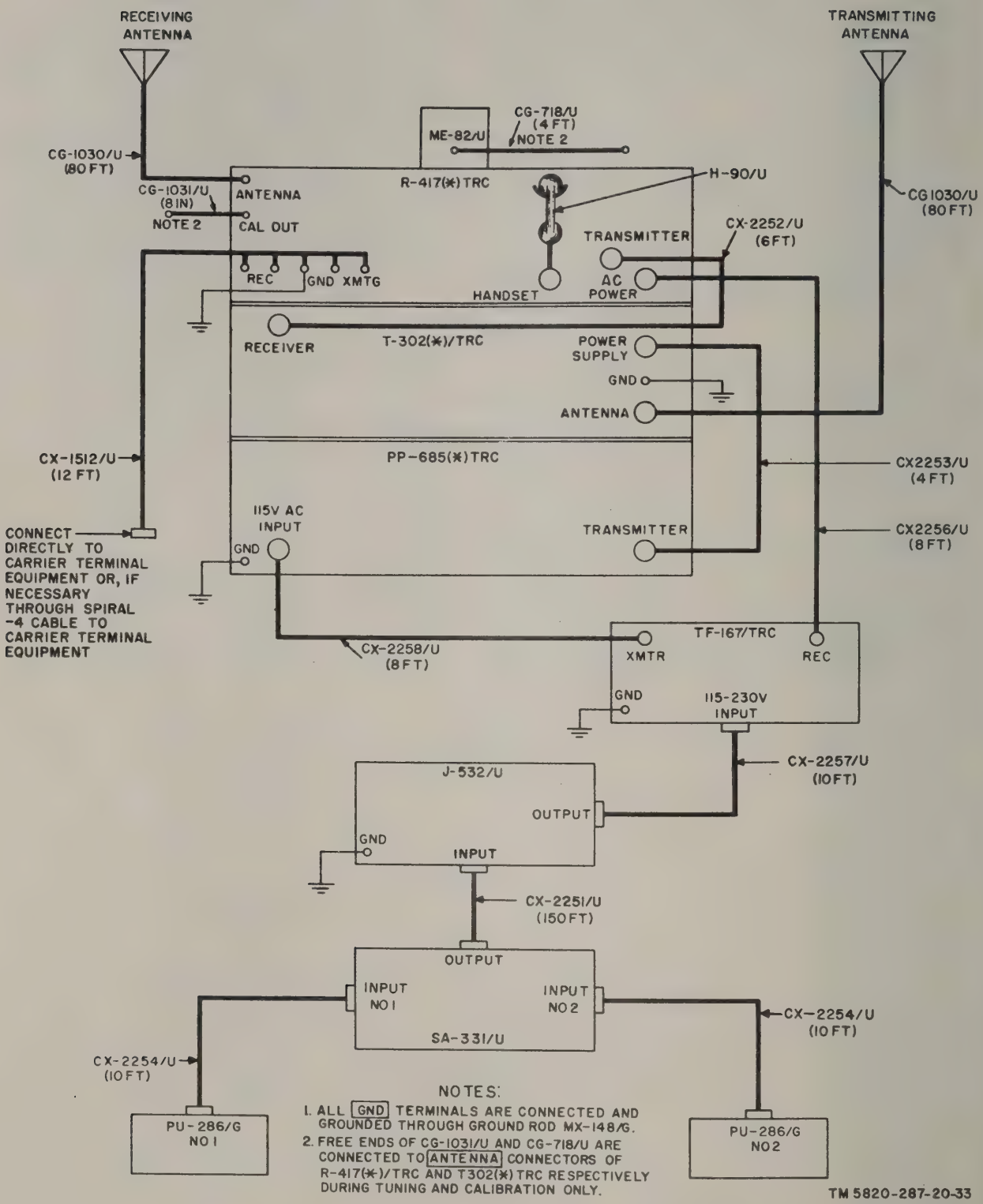
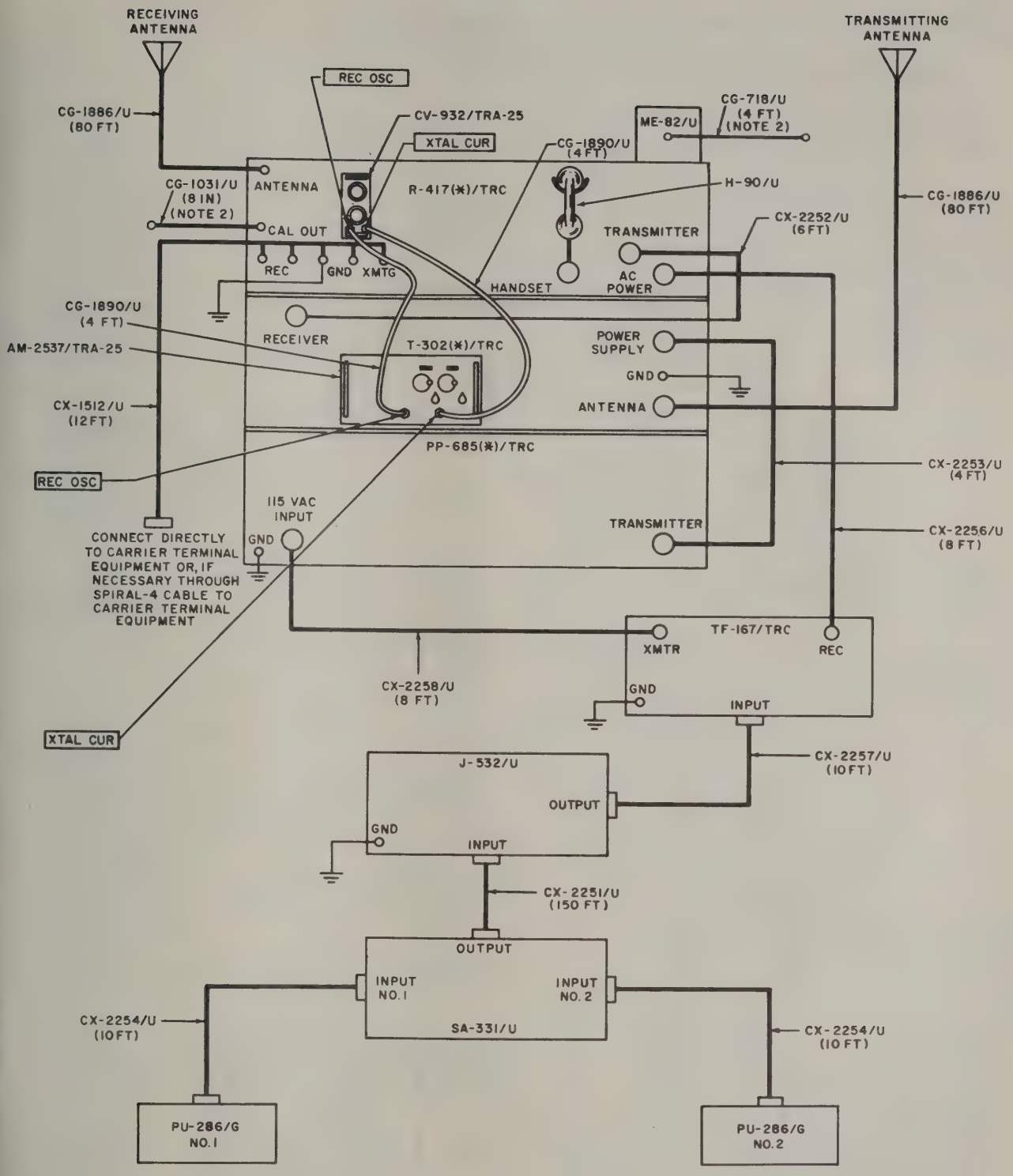


Figure 32. Radio terminal connection diagram for A-, B-, C-, or D-band operation.

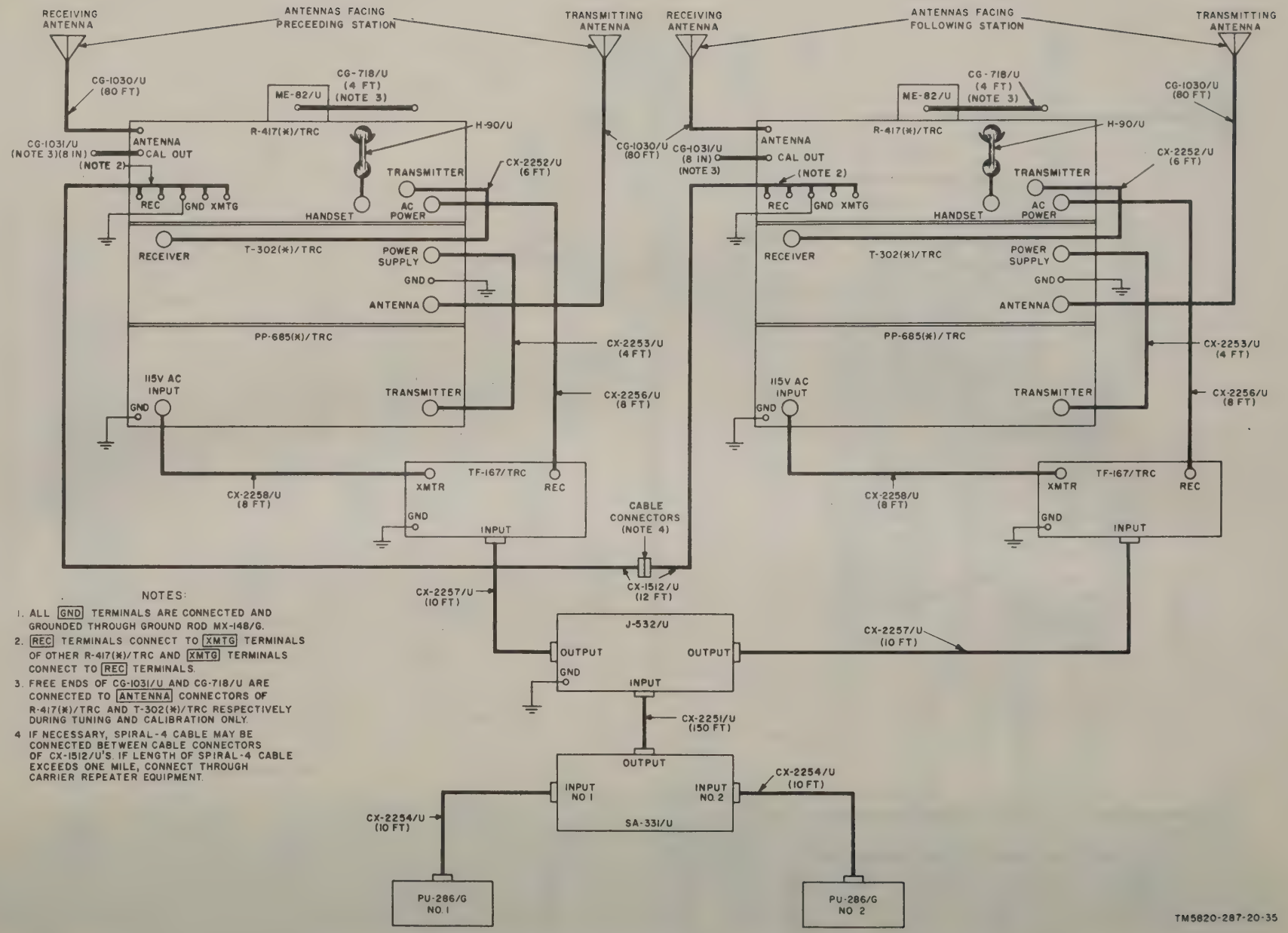


NOTES:

1. ALL GND TERMINALS ARE INTERCONNECTED AND GROUNDED THROUGH GROUND ROD MX-148/G.
2. FREE ENDS OF CG-1031/U AND CG-718/U ARE CONNECTED TO ANTENNA CONNECTORS OF R-417(*)/TRC AND T-302(*)/TRC RESPECTIVELY DURING TUNING AND CALIBRATION ONLY.

TM5820-287-20-34

Figure 33. Radio terminal connection diagram for F-band operation.



NOTES:

1. ALL [GND] TERMINALS ARE CONNECTED AND GROUNDED THROUGH GROUND ROD MX-148/G.
2. [REC] TERMINALS CONNECT TO [XMTG] TERMINALS OF OTHER R-417(*)/TRC AND [XMTG] TERMINALS CONNECT TO [REC] TERMINALS.
3. FREE ENDS OF CG-1031/U AND CG-718/U ARE CONNECTED TO [ANTENNA] CONNECTORS OF R-417(*)/TRC AND T-302(*)/TRC RESPECTIVELY DURING TUNING AND CALIBRATION ONLY.
4. IF NECESSARY, SPIRAL-4 CABLE MAY BE CONNECTED BETWEEN CABLE CONNECTORS OF CX-1512/U'S. IF LENGTH OF SPIRAL-4 CABLE EXCEEDS ONE MILE, CONNECT THROUGH CARRIER REPEATER EQUIPMENT.

Figure 34. Radio repeater connection diagram for A-, B-, C-, or D-band operation.

CHAPTER 4

INSTALLATION ADJUSTMENTS

40. Calibrating R–417(*)/TRC

Perform the following procedures at each station.

a. Disconnect the CG–1030/U or CG–1886/U (fig. 32, 33, or 34) from the ANTENNA connector of the R–417(*)/TRC.

b. Connect the free end of the CG–1031/U to the ANTENNA connector of the R–417-(*)/TRC.

c. Perform the *preoperational procedures* (TM 11–5820–287–10).

d. Operate the PU–286/G (TM 11–940A).

e. Operate the 115V AC circuit breaker (PP–685(*)/TRC) to ON.

Note. For location and function of controls or indicators on the radio components, refer to the *controls and indicators* chapter of TM 11–5820–287–10.

f. Operate the INCR OUT switch (TF–167/TRC) until the AC VOLTS meter (PP–685-(*)/TRC) indicates 115 volts ±5.5.

g. Operate the 150V DC circuit breaker to ON.

h. Allow approximately 10 minutes before proceeding.

i. Operate the DC TEST switch to 150 UPPER SCALE.

j. Adjust the 150V ADJ control for 150-volt indication on the DC VOLTS meter.

k. Operate the POWER circuit breaker (R–417(*)/TRC) to ON.

l. Loosen the camlock fasteners (fig. 35) and slide the R–417(*)/TRC approximately halfway out of its case.

***Warning:* Dangerous voltages are present in the R–417(*)/TRC. Be extremely careful to avoid the danger of electrical shock.**

m. Operate the MEASURE switch to B+.

n. Adjust the 150V ADJ control (B, fig. 35) for a 30-microampere indication on the MEASURE meter.

o. Operate the MEASURE switch to AFC BAL.

p. Operate and hold the AFC DISABLE switch to the on position.

q. Adjust the AFC BAL control (A, fig. 35) for a minimum indication on the MEASURE meter.

r. Release the AFC DISABLE switch.

s. Operate the MEASURE switch to MTR CAL.

t. Operate the MEASURE switch (T–302-(*)/TRC) to 1 KC ADJ.

u. Adjust the 1 KC ADJ control for a 0-decibel (db) ±0.5 indication on the MEASURE meter of the T–302(*)/TRC.

v. Adjust the ADJ METER control for a 0-db ±0.5 indication on the MEASURE meter (R–417(*)/TRC).

w. Slide the R–417(*)/TRC into its case and secure it with the camlock fasteners (B, fig. 35).

41. Single-Link Radio Section Antenna Orientation

Designate the radio terminal at one end of the radio section as station A (control station). Designate the radio terminal at the other end of the radio section as station B. Perform the procedures given in *a* below if the transmitting and receiving antennas at each station are installed on the same antenna support, and in *b* below if the antennas are installed on separate antenna supports.

a. One Antenna Support.

(1) Perform the following procedures at stations A and B:

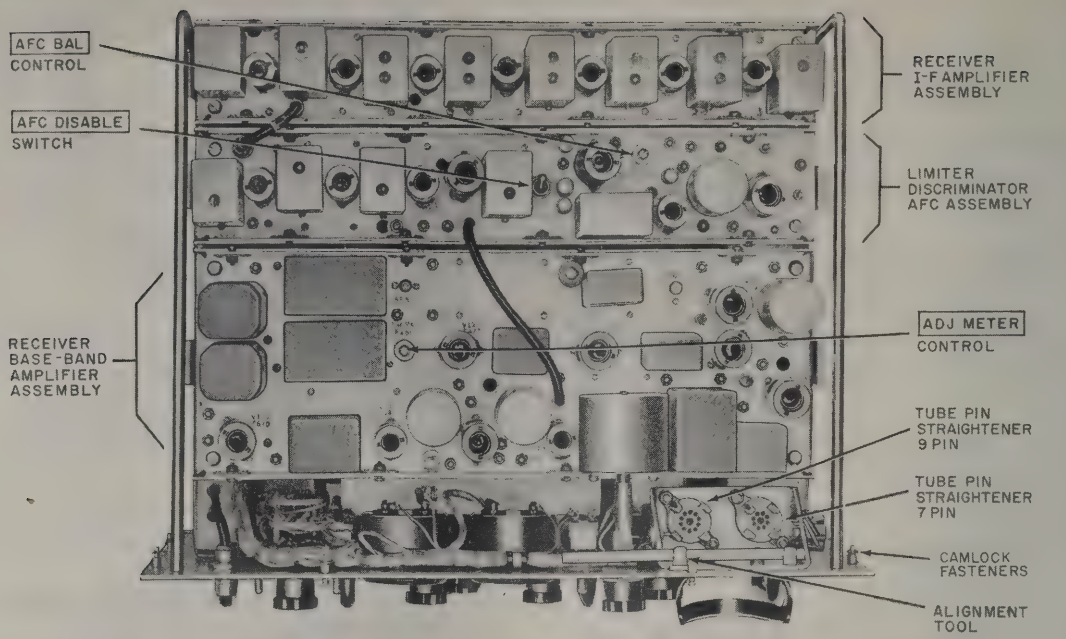
(*a*) Perform the *tuning procedures* (TM 11–5820–287–10).

(*b*) Adjust the SQUELCH control (R–417(*)/TRC) for a 10-microampere indication on the MEASURE meter.

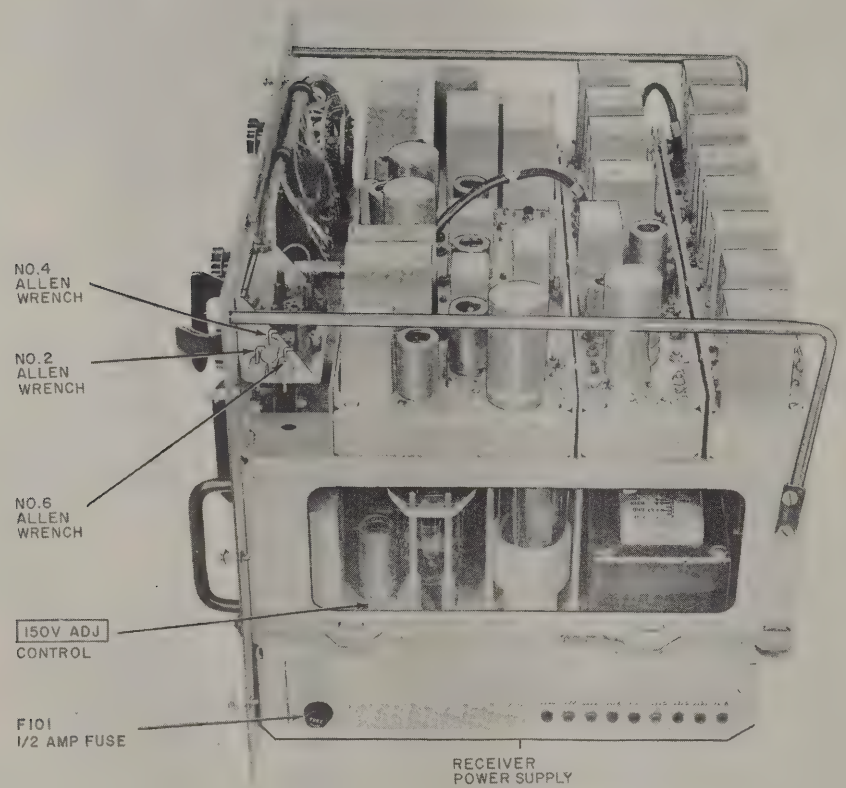
(2) Perform the following procedures at station A:

(*a*) Loosen the swivel locks (fig. 10) and slowly move the gin pole (fig. 30) back and forth in a 15° arc until a maximum indication is obtained on the MEASURE meter (R–417(*)/TRC).

(*b*) Tighten the swivel locks (fig. 10) and secure the free end of each MX–1483/G (75 ft) (fig. 30) to the top hole of the guy stake clamp (fig. 19) on the ground stakes.



A. TOP VIEW



B. SIDE VIEW

TM5820-287-20-36

Figure 35. R–417(*)/TRC, location of calibration adjustments and tools.

(3) Perform the procedures given in (2) (*a*) and (*b*) above at station B.

b. Two Antenna Supports.

(1) Perform the procedures given in (1) (*a*) and (*b*) above at stations A and B.

(2) Perform the following procedures at station A:

(*a*) Perform the procedures given in *a*(2) (*a*) and (*b*) above for the antenna support of the receiving antenna.

(*b*) Operate the order-wire circuit and instruct the installer at station B to perform the procedures given in (3) below.

(3) When instructed by the installer at station A, perform the following procedures:

(*a*) Loosen the swivel locks (fig. 10) and slowly move the gin pole (fig. 30) of the antenna support for the transmitting antenna back and forth in a 15° arc.

(*b*) When the installer at station A obtains a maximum indication on the MEASURE meter (R–417(*)/TRC), tighten the swivel locks (fig. 10) and secure the free end of each MX–1483/G (75 ft) (fig. 30) to the top hole of the guy stake clamp (fig. 19) on the ground stakes.

(*c*) Perform the procedures given in *a*(2) (*a*) and (*b*) above for the antenna support of the receiving antenna.

(*d*) Instruct the installer at station A to perform the procedures given in (4) below.

(4) When instructed by the installer at station B, perform the procedures given in (3) (*a*) and (*b*) above.

42. Multiple-Link Radio Section Antenna Orientation

Perform the procedures given in *a* below if the transmitting and receiving antennas at each station are installed on the same antenna support, and in *b* below if the antennas are installed on separate antenna supports.

a. One Antenna Support.

(1) Perform the following procedures at all stations:

(*a*) Perform the tuning procedures (TM 11–5820–287–10).

(*b*) Adjust the SQUELCH control (R–417(*)/TRC) for a 10-microampere indication on the MEASURE meter.

(2) Perform the following procedures at the control station:

(*a*) Loosen the swivel locks (fig. 10) and slowly move the gin pole (fig. 30) back and forth in a 15° arc until a maximum indication is obtained on the MEASURE meter (R–417-(*)/TRC).

(*b*) Tighten the swivel locks (fig. 10) and secure the free end of each MX–1483/G (75 ft) (fig. 30) to the top hole of the guy stake clamp (fig. 19) on the ground stakes.

(3) Perform the procedures given in (2) (*a*) and (*b*) above at each station until all antennas from the control station to the end station have been properly oriented.

b. Two Antenna Supports. The procedures in (1) through (4) below orient the receiving and transmitting antennas for one link of the radio section. These procedures must be repeated for each link with either station acting as the control station.

(1) Perform the procedures given in *a*(1) (*a*) and (*b*) above at all stations.

(2) Perform the following procedures at the control station:

(*a*) Perform the procedures given in *a*(2) (*a*) and (*b*) above for the antenna support of the receiving antenna.

(*b*) Operate the order-wire circuit and instruct the installer of the following station to perform the procedures given in (3) below.

(3) When instructed by the installer at the control station, perform the following procedures:

(*a*) Loosen the swivel locks (fig. 10) and slowly move the gin pole (fig. 30) of the antenna support for the transmitting antenna back and forth in a 15° arc.

(*b*) When the installer at the control

station obtains a maximum indication on the MEASURE meter (R–417(*)/TRC), secure the free end of each MX–1483/G (75 ft) (fig. 30) to the top hole of the guy stake clamp (fig. 19) on the ground stakes.

(*c*) Perform the procedures given in *a*(2) (*a*) and (*b*) above for the antenna support of the receiving antenna.

(*d*) Instruct the installer at the control station to perform the procedures given in (4) below.

(4) Perform the procedures given in (3) (*a*) and (*b*) above at the control station when instructed by the installer of the following station.

43. Noise Measurements

Perform the radio *section lineup* (TM 11–5820–287–10) and make the noise measurements outlined below for each link of the radio section.

a. Operate the 600 OHMS-135 OHMS switch (R–417(*)/TRC) to 135 OHMS.

b. Operate the MEASURE switch (T–302-(*)/TRC) to MOD ADJ.

c. Disconnect the leads of the CX–1512/U (fig. 32, 33, or 34) from the R–417(*)/TRC.

d. Connect one end of the 0.1-microfarad (uf) capacitor (stored in the running spares drawer of the MK–133/TRC) to one of the REC terminals of the R–417(*)/TRC.

e. Connect the 130-ohm resistor (stored in the running spares drawer of the MK–133/TRC) between the free end of the 0.1-uf capacitor and the GND terminal.

f. Connect the ME–30/U across the 130-ohm resistor. The leads between the ME–30/U and 130-ohm resistor must not exceed 3 feet.

g. Note the indication on the ME–30/U and compare it to the allowable indication provided in the chart below.

Number of Links in radio section	Allowable indication per link (volts)	
	4-channel system	12-channel system
1	0.079	0.025
2	0.056	0.018
3	0.045	0.0142
4	0.040	0.0124
5	0.035	0.0112
6	0.031	0.01
7	0.028	0.0089
8	0.028	0.0089

h. If the indication on the ME–30/U (*g* above) does not exceed the allowable indication, perform the procedures given in (1) through (4) below.

(1) Disconnect the ME–30/U from the 130-ohm resistor.

(2) Disconnect the 130-ohm resistor and the 0.1-uf capacitor from the R–417(*)/TRC.

(3) Store the 130-ohm resistor and the 0.1-uf capacitor in the running spares drawer of the MK–133/TRC.

(4) Perform the *stopping procedures* (TM 11–5820–287–10).

i. If the indication on the ME–30/U (*g* above) exceeds the allowable indication, perform the procedures given in (1) through (4) below.

(1) Increase the INPUT ADJ control (T–302(*)/TRC) by three positions (3 db).

(2) Decrease the OUTPUT ADJ control (R–417(*)/TRC) by three positions (3 db).

(3) Note the indication on the ME–30/U and compare it to the allowable indication provided in the chart (*g* above).

Note. The settings of the INPUT ADJ control (T–302(*)/TRC) and OUTPUT ADJ control (R–417(*)/TRC) may be increased and decreased respectively by 6 db. If a 6-db change does not reduce the indication on the ME–30/U below the allowable indication, the link must be shortened.

(4) When the correct indications have been obtained on the ME–30/U, perform the procedures given in *h*(1) through (4) above.

Caution: **If the link is to be used with an increased setting of the INPUT ADJ control (T–302(*)/TRC) and a decreased setting of the OUTPUT ADJ control (R–417(*)/TRC), instruct the operator *not* to turn the MEASURE switch (T–302(*)/TRC) to 1 KC IN, 68 KC IN, MOD 1 KC, or MOD 68 KC IN. Placing the MEASURE switch in any of these positions may damage the MEASURE meter.**

CHAPTER 5

MAINTENANCE INSTRUCTIONS

Section I. GENERAL MAINTENANCE

Warnings:

1. When power is disconnected from the equipment, some capacitors may still retain dangerous voltages. Discharge the capacitors with the test prod (Federal stock No. 6625–510–1841) before working on the equipment.

2. The failure of selenium rectifiers results in the liberation of poisonous fumes and the deposit of poisonous selenium compounds. If the rectifier burns out or arcs over, the odor is strong. Provide adequate ventilation immediately. *Avoid inhaling the fumes and do not handle the damaged rectifier until it has cooled.*

44. Scope of Second Echelon Maintenance

a. The maintenance duties normally performed at second echelon are listed in *b* below. These duties are limited by the available spare parts, tools, materials, and test equipment.

b. Second echelon maintenance consists of the following:

(1) Preventive maintenance (para 46).
(2) Lubrication (para 47).
(3) Visual inspection (para 48).
(4) Equipment performance check (para 49).
(5) Repairs (para 50 through 55).

c. Second echelon maintenance of the PU–286/G is covered in TM 11–940A.

45. Tools, Materials, and Test Equipment Required

a. Tools Supplied With Components. Some of the tools required for second echelon maintenance of the various components are supplied with the components. The tools and their location in the components are as follows:

Component	Tool	Figure No.
R–417(*)/TRC	Pin straightener (7-pin)	35
	Pin straightener (9-pin)	35
	Alignment tool	35
	No. 2 Allen wrench	35
	No. 4 Allen wrench	35
	No. 6 Allen wrench	35
AM–915(*)/TRC, AM–1178/GRC, and AM–1180/GRC	Tube puller	36
AM–2537/TRA–25	Tube puller	37
	No. 6 Allen wrench	37
	No. 4 multiple spline wrench	37
	No. 4 multiple spline wrench (modified)	37
	No. 6 multiple spline wrench (modified)	37

b. Tools Not Supplied.

(1) Tool Equipment TE–41.
(2) Tool Equipment TE–113.
(3) Test prod (Federal stock No. 6625–510–1841).

c. Materials.

(1) Orangestick.
(2) Lint-free cloth.
(3) Sandpaper #000.
(4) Cleaning Compound (Federal stock No. 7930–395–9542).

d. Test Equipment.

(1) Multimeter AN/URM–105.
(2) Test Set, Electron Tube TV–7/U or equivalent.

46. Preventive Maintenance

a. DA Form 11–238. Items 1 through 28 on DA Form 11–238 (fig. 38 and 39) constitute the preventive maintenance checklist to be used for second echelon maintenance. Items not applicable to the equipment are lined out. Reference in the ITEM block are to paragraphs which contain additional maintenance information pertinent to the particular item. Follow the instructions on the form.

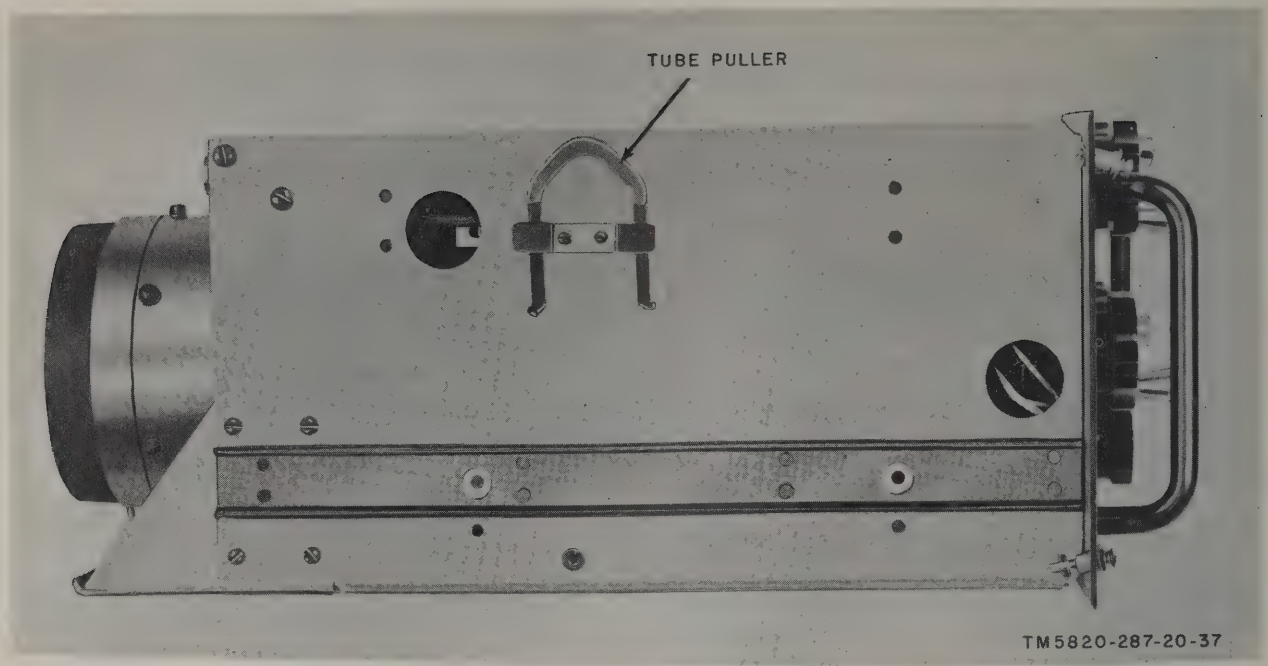


Figure 36. AM–915(*)/TRC, AM–1178/GRC, or AM–1180/GRC, side view showing location of tube puller.

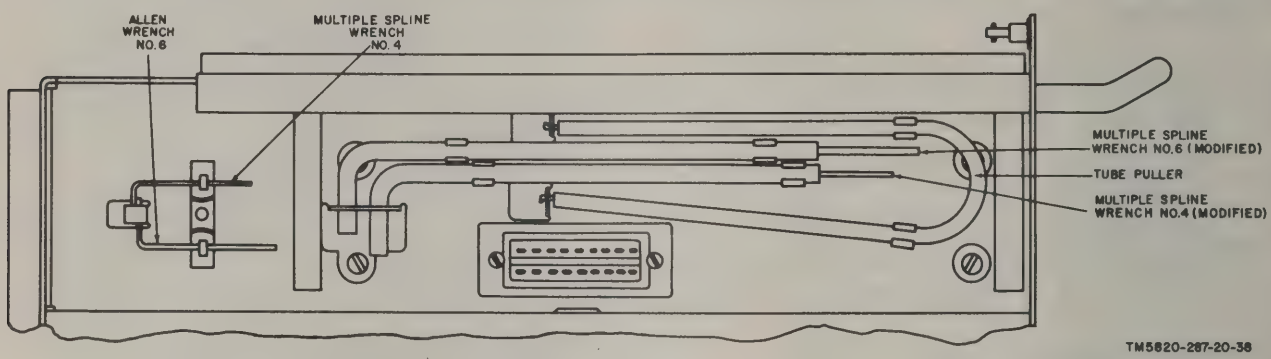


Figure 37. AM–2537/TRA–25, side view showing location of tools.

b. Items. The information shown below supplements DA Form 11–238. The item numbers correspond to the ITEM numbers on the form. *Do not* perform the maintenance procedures in items 2 through 7, 11, and 14 through 26 with the power on. These maintenance procedures should be performed during interruptions in system service. For additional supplementary information on items 1 through 12, refer to TM 11–5820–287–10.

Item	Maintenance procedures
11	Remove and clean the air filter in the R–417(*)/TRC (para 51), T–302(*)/TRC (para 52), and PP–685(*)/TRC (para 51). When inspecting meters for damaged glass, adjust the zero setting of the meter needle.
15	Check the camlock seating of plug-in assemblies in the equipment.
19	If necessary, wet a cloth with cleaning compound and clean the parts; dry the parts with a lint-free cloth.
26	Check the coaxial connectors and wrap a protective layer of tape around the connectors.
27	Refer to the equipment performance checklist (para 49) when checking for normal operation.

Warning: **Cleaning compound is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation.**

47. Lubrication

Caution: **Do not overlubricate. Accumulation of lubricant with dirt may cause serious damage to movable parts.**

All lubrication for this equipment is performed on a yearly basis except the transmitter

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS		CONDITION
26. INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS.	PARA 46 b	✓
27. CHECK FOR NORMAL OPERATION.	PARA 49	✓
28. ~~BEFORE SHIPPING OR STORING, REMOVE BATTERIES~~		

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

15: TUBE SOCKET XV116 CRACKED (RADIO RECEIVER R-417/TRC). REPORTED TO 3D ECHELON MAINTENANCE FOR REPAIR.

FOLD

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
SOUND EQUIPMENT, RADIO, DIRECTION FINDING
RADAR, CARRIER, RADIOSONDE AND TELEVISION
(AR 750-625)

EQUIPMENT NOMENCLATURE: RADIO SET AN/TRC-24

EQUIPMENT SERIAL NUMBER: 130

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*

2. The following action will be taken by either the Communications Officer/Chief for 1st echelon, or the Inspector for higher echelon:
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

TYPE OF INSPECTION

OPERATOR	2/3 ECHELON	DATE	SIGNATURE
	✓	30 SEPT 1960	J. JONES

DA FORM 1 MAY 57 11-238

REPLACES DA FORMS 11-238, 1 NOV 55; 11-239, 11-244, 11-245, 11-248, 11-249, 11-250, AND 11-251; WHICH ARE OBSOLETE.

Figure 38. DA Form 11–238, pages 1 and 4.

LEGEND for marking conditions:
Satisfactory, ✓.
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF **SEPTEMBER 1960**

NO.	DAILY ITEM	1 17	2* 18	3 19	4 20	5 21	6 22	7 23	8 24	9 25	10 26	11 27	12 28	13 29	14 30	15 31	16	2D 3D ECHELON
1.	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT. *(Transmitter, receiver, carrying cases, wire, cables, ~~microphones, tubes,~~ spare parts, technical manuals).*	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		✓
2.	CLEAN DIRT AND MOISTURE FROM ANTENNA, ~~MICROPHONES, HEADSETS, KEYS,~~ JACKS, PLUGS, COMPONENT PANELS.	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		✓
3.	INSPECT CONTROLS FOR NORMAL OPERATION. TAP CONTROLS LIGHTLY FOR EVIDENCE OF CUT-OUT FROM LOOSE CONTACTS.	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		✓
4.	CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR UNUSUAL OPERATION OR CONDITION.	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		✓

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D ECH	ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
5. CLEAN AND TIGHTEN EXTERIORS OF CASES, RACKS, MOUNTS, TRANSMISSION LINES.						✓	15. INSPECT SEATING OF READILY ACCESSIBLE PLUCK-OUT ITEMS: TUBES, LAMPS, FUSES, CRYSTALS, CONNECTORS, ~~VIBRATORS, PLUG-IN COILS.~~ PARA 46 b	X
6. INSPECT CASES, MOUNTS, ANTENNA TOWERS AND EXPOSED METAL SURFACES FOR RUST, CORROSION.						✓	16. INSPECT RELAYS AND CIRCUIT BREAKERS FOR LOOSE MOUNTINGS, ~~BAD CONTACTS, MIS-ALINEMENT OF CONTACTS AND SPRINGS, PROPER SPRING TENSION.~~	✓
7. INSPECT CORDS, CABLE, WIRE, SHOCK MOUNTS FOR CUTS, KINKS, BREAKS, FRAYING, UNDUE STRAIN.						✓	17. INSPECT VARIABLE CAPACITORS FOR DIRT, ~~MIS-ALINEMENT OF PLATES,~~ LOOSE MOUNTINGS, MOISTURE.	✓
8. CHECK ANTENNA GUY WIRES FOR PROPER TENSION OR DAMAGE.						✓	18. INSPECT RESISTORS, BUSHINGS AND INSULATORS FOR CRACKS, CHIPPING, BLISTERING, MOISTURE, DISCOLORATION.	✓
9. INSPECT CANVAS AND LEATHER ITEMS FOR MILDEW, TEARS, FRAYING.						✓	19. CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE. PARA 46 b	✓
10. INSPECT ACCESSIBLE ITEMS FOR LOOSENESS: SWITCHES, KNOBS, JACKS, CONNECTORS, ~~RELAYS, TRANSFORMERS, MOTORS,~~ PILOT LIGHTS, BLOWERS, ETC.						✓	20. INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.	✓
11. CLEAN AND/OR INSPECT AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS. PARA 46 b						✓	21. INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR DIRT, CORROSION, LOOSE CONTACTS.	✓
12. ~~INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, SPECIFIC GRAVITY, DAMAGED CASES. INSPECT DRY BATTERIES FOR LEAKAGE.~~							22. INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR OVERHEATING ~~AND OIL LEAKAGE.~~	✓
							23. ~~INSPECT GENERATORS, AMPLIDYNES, DYNAMOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND FITTING OF COMMUTATOR.~~	
							24. ~~INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS.~~	
ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS						CONDITION	25. INSPECT WATERPROOF GASKETS FOR LEAKS, WORN OR LOOSE PARTS.	✓
13. INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER-PROOFING, TEARS, FRAYING.						✓		
14. CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LEAKS, DAMAGED GASKETS, GREASE.						✓		

CONTINUED ON PAGE 4

2 3

☆ GPO 1957 O—427034

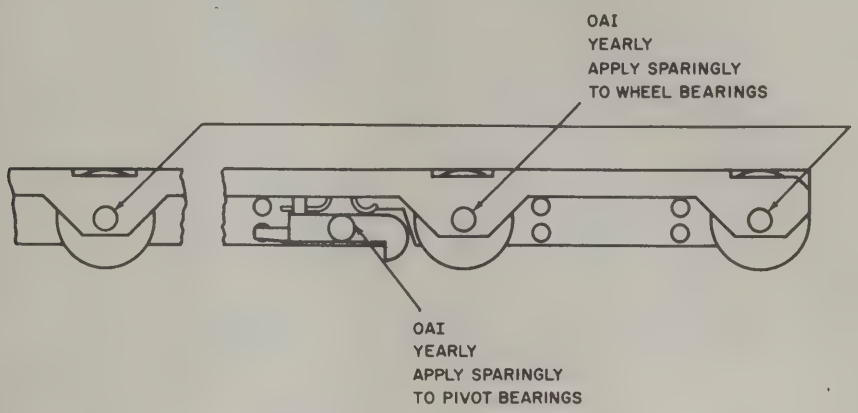
Figure 39. DA Form 11-238, pages 2 and 3.

blower motor (A, fig. 43), which is lubricated on a monthly basis, the AB–325/TRC guy plates (A, fig. 54), and the T–302(*)/TRC attenuator bearings and shaft bearings (fig. 42), which are lubricated every 3 years. Use the procedures outlined below when lubricating the equipment.

a. Refer to the appropriate figure (fig. 40 through 54) to determine the type of lubricant, the time interval, and the specific instructions for the amount of lubricant required.

b. Before lubrication, clean all surfaces to be lubricated with a lint-free cloth dampened with cleaning compound.

c. After lubrication, wipe off all excess lubricant with a dry lint-free cloth.



A. LUBRICATION POINTS

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449

B. LUBRICANT TABLE

TM5820-287-20-41

Figure 40. Drawer slide assembly, lubrication points.

Section II. TROUBLESHOOTING

48. Visual Inspection

Before operating the equipment, inspect it to save repair time and avoid further damage. Inspect the following items for obvious defects.

a. Cables improperly connected (fig. 32, 33, or 34).

b. Worn, broken, or disconnected cables or plugs.

c. Burned-out fuses.

d. Switches or controls improperly set (TM 11–5820–287–10).

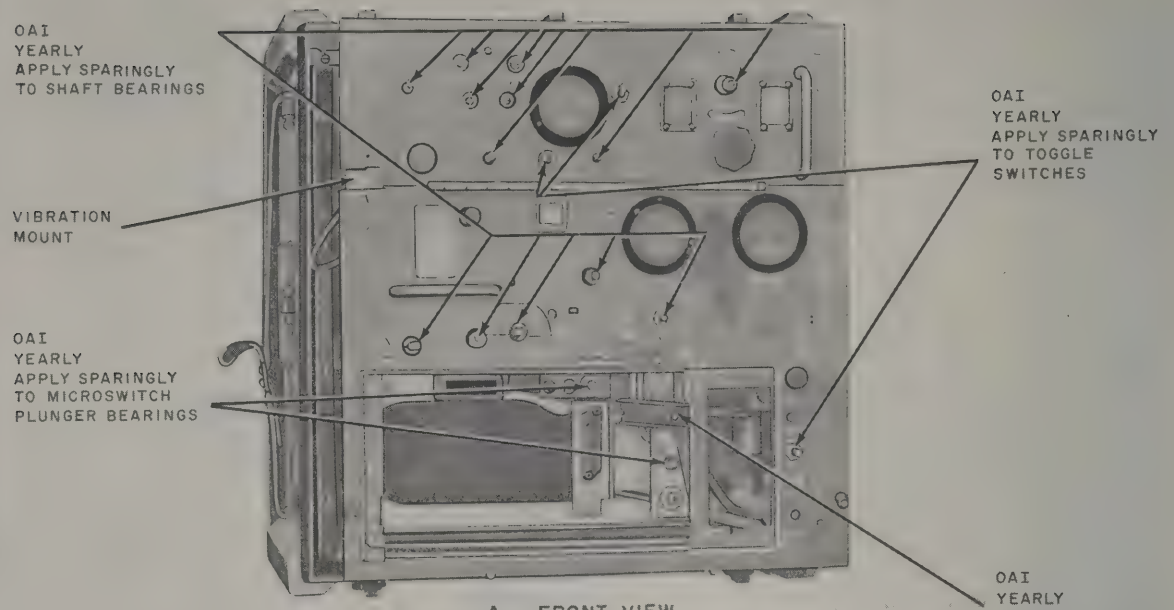
e. Condition of all tubes.

f. Condition of blower motors.

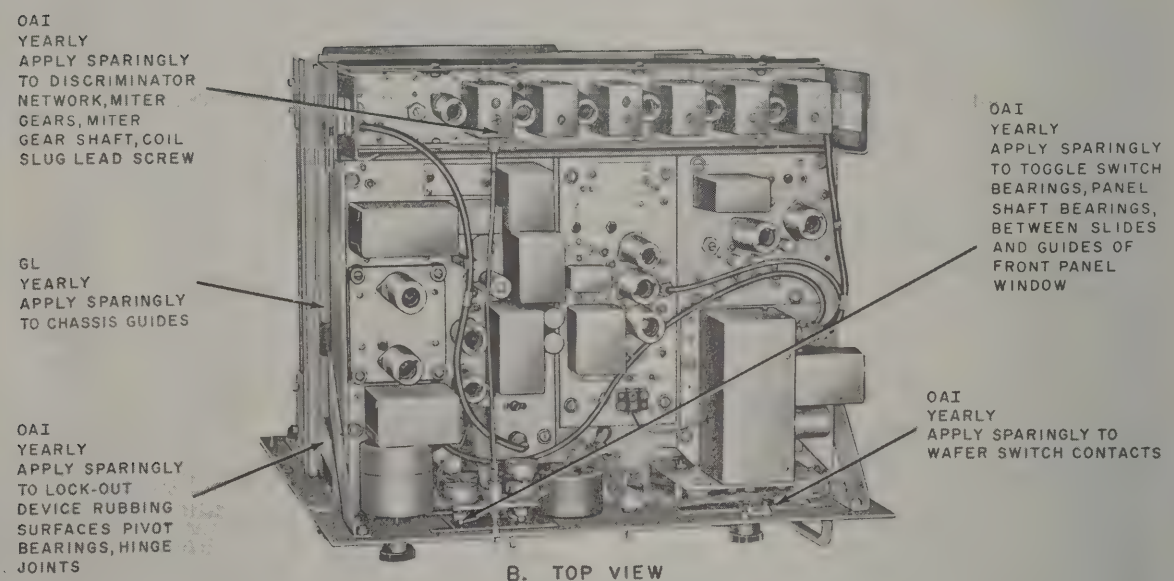
g. Condition of lightning arresters (R–417(*)/TRC).

49. Equipment Performance Checklist

a. General. All corrective measures which second echelon maintenance personnel can perform are given in the *Corrective measure* column. If the action taken does not correct the fault, additional maintenance must be performed by higher echelon maintenance personnel. Note on the repair tag how the equipment performed and what corrective measures were taken. In using the checklist, start at the beginning and follow each step in the order listed to locate trouble. However, if trouble is suspected in a particular area, start checking at that point and continue the steps sequentially.



A. FRONT VIEW



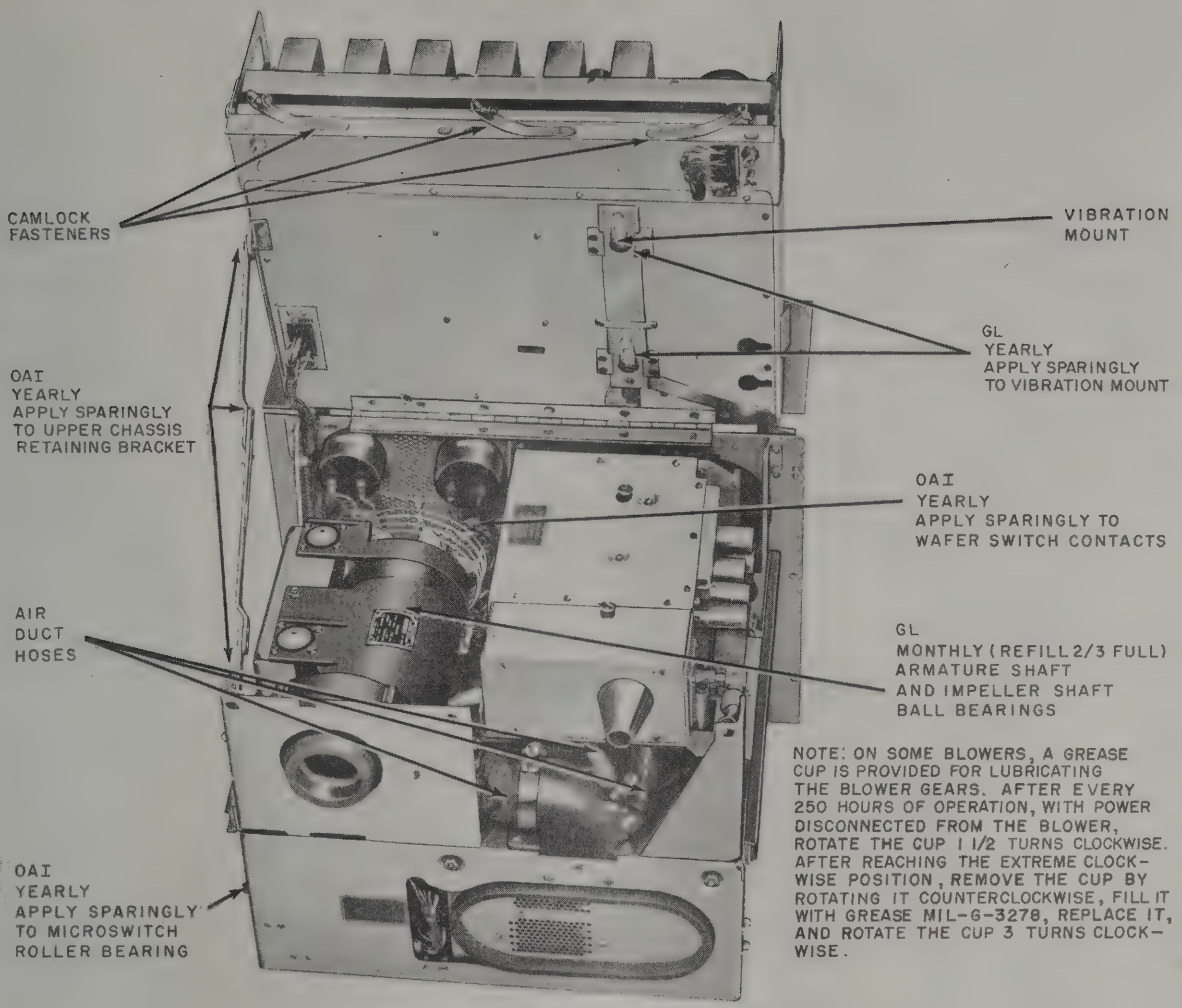
B. TOP VIEW

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449
GREASE, AIRCRAFT AND INSTRUMENT MIL-G-3278	GL	9150-261-8297

C. LUBRICANT TABLE

TM5820-287-20-42

Figure 41. T–302(*)/TRC, front panel controls and upper chassis, lubrication points.


CAMLOCK FASTENERS
VIBRATION MOUNT
GL YEARLY APPLY SPARINGLY TO VIBRATION MOUNT
OAI YEARLY APPLY SPARINGLY TO UPPER CHASSIS RETAINING BRACKET
OAI YEARLY APPLY SPARINGLY TO WAFER SWITCH CONTACTS
AIR DUCT HOSES
GL MONTHLY (REFILL 2/3 FULL) ARMATURE SHAFT AND IMPELLER SHAFT BALL BEARINGS
NOTE: ON SOME BLOWERS, A GREASE CUP IS PROVIDED FOR LUBRICATING THE BLOWER GEARS. AFTER EVERY 250 HOURS OF OPERATION, WITH POWER DISCONNECTED FROM THE BLOWER, ROTATE THE CUP 1 1/2 TURNS CLOCKWISE. AFTER REACHING THE EXTREME CLOCKWISE POSITION, REMOVE THE CUP BY ROTATING IT COUNTERCLOCKWISE, FILL IT WITH GREASE MIL-G-3278, REPLACE IT, AND ROTATE THE CUP 3 TURNS CLOCKWISE.
OAI YEARLY APPLY SPARINGLY TO MICROSWITCH ROLLER BEARING

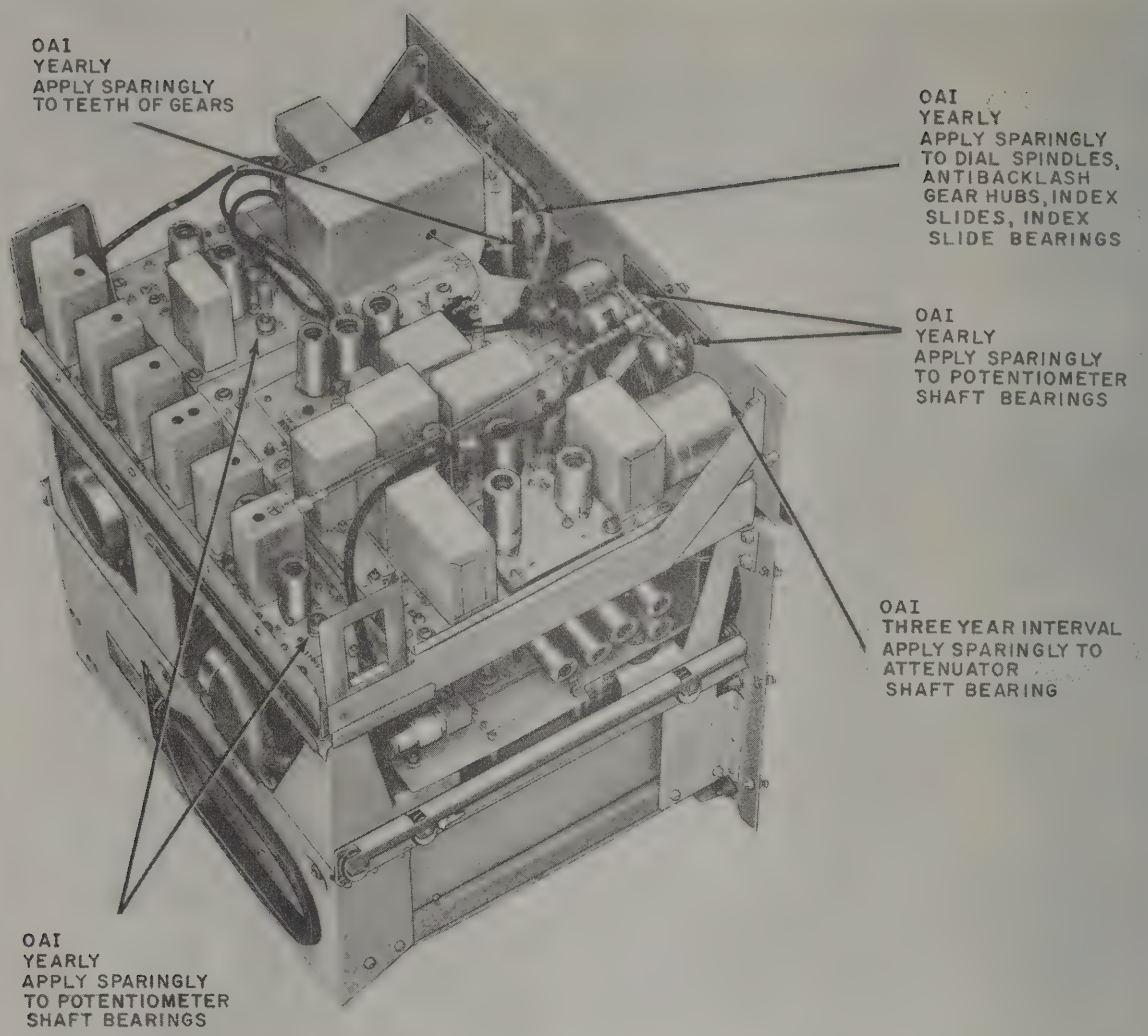
A. TOP VIEW OF LOWER CHASSIS

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449
GREASE, AIRCRAFT AND INSTRUMENT MIL-G-3278	GL	9150-261-8297

B. LUBRICANT TABLE

TM5820-287-20-43

Figure 42. T–302(*)/TRC, lower chassis, lubrication points.



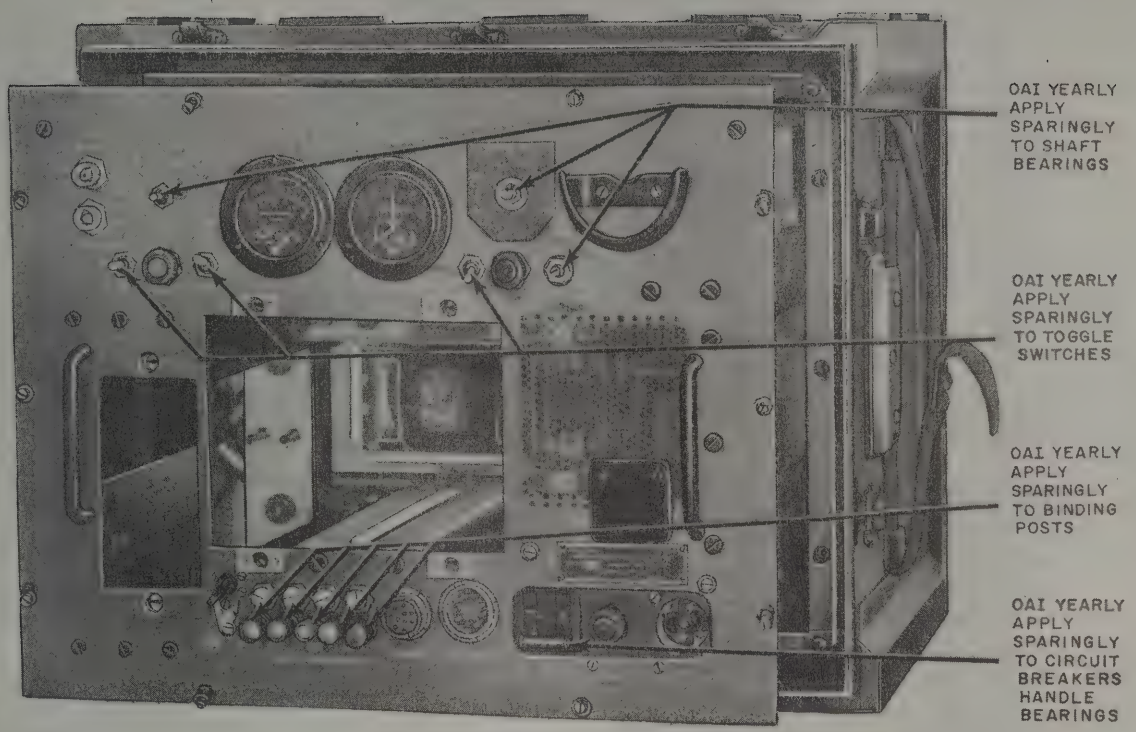
A. TOP VIEW OF PULSED OSCILLATOR ASSEMBLY

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT ML-L-6085A	OAI	9150-257-5449

B. LUBRICANT TABLE

TM5820-287-20-75

Figure 43. T–302(*)/TRC, pulsed oscillator assembly, lubrication points.



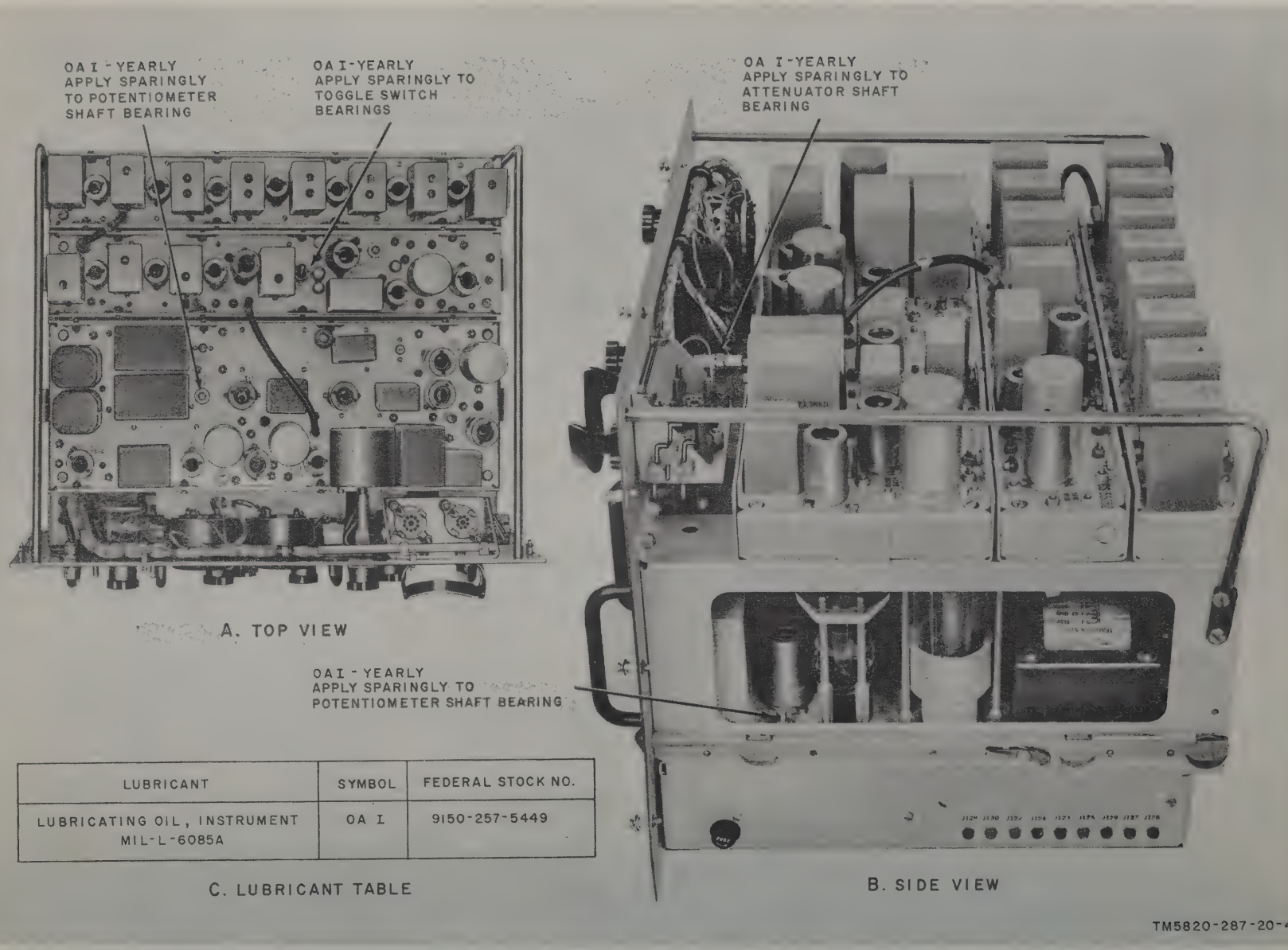
A. FRONT VIEW

LUBRICANT	SYMBOL	FEDERAL STOCK NUMBER
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449

B. LUBRICANT TABLE

TM5820-287-20-44

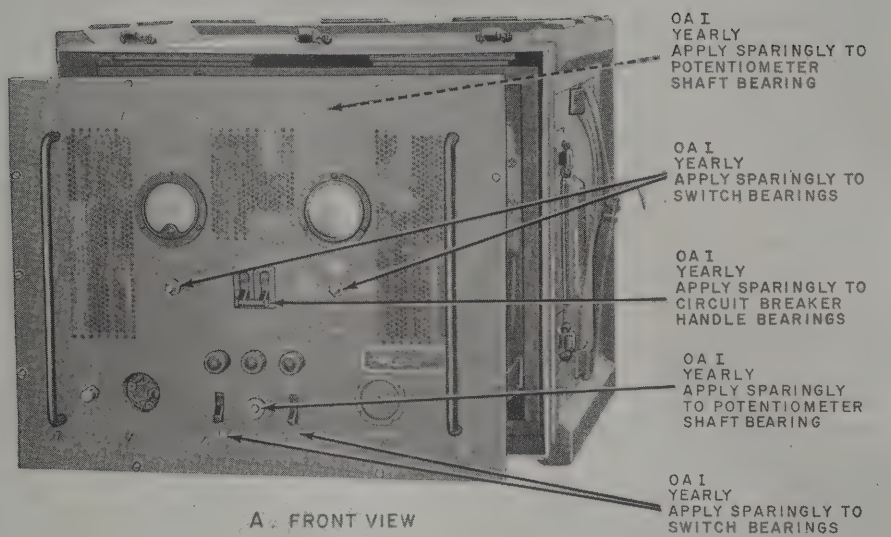
Figure 44. R–417(*)/TRC, front panel controls, lubrication points.



LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OA I	9150-257-5449

C. LUBRICANT TABLE

Figure 45. R–417(*)/TRC, upper and lower chassis, lubrication points.



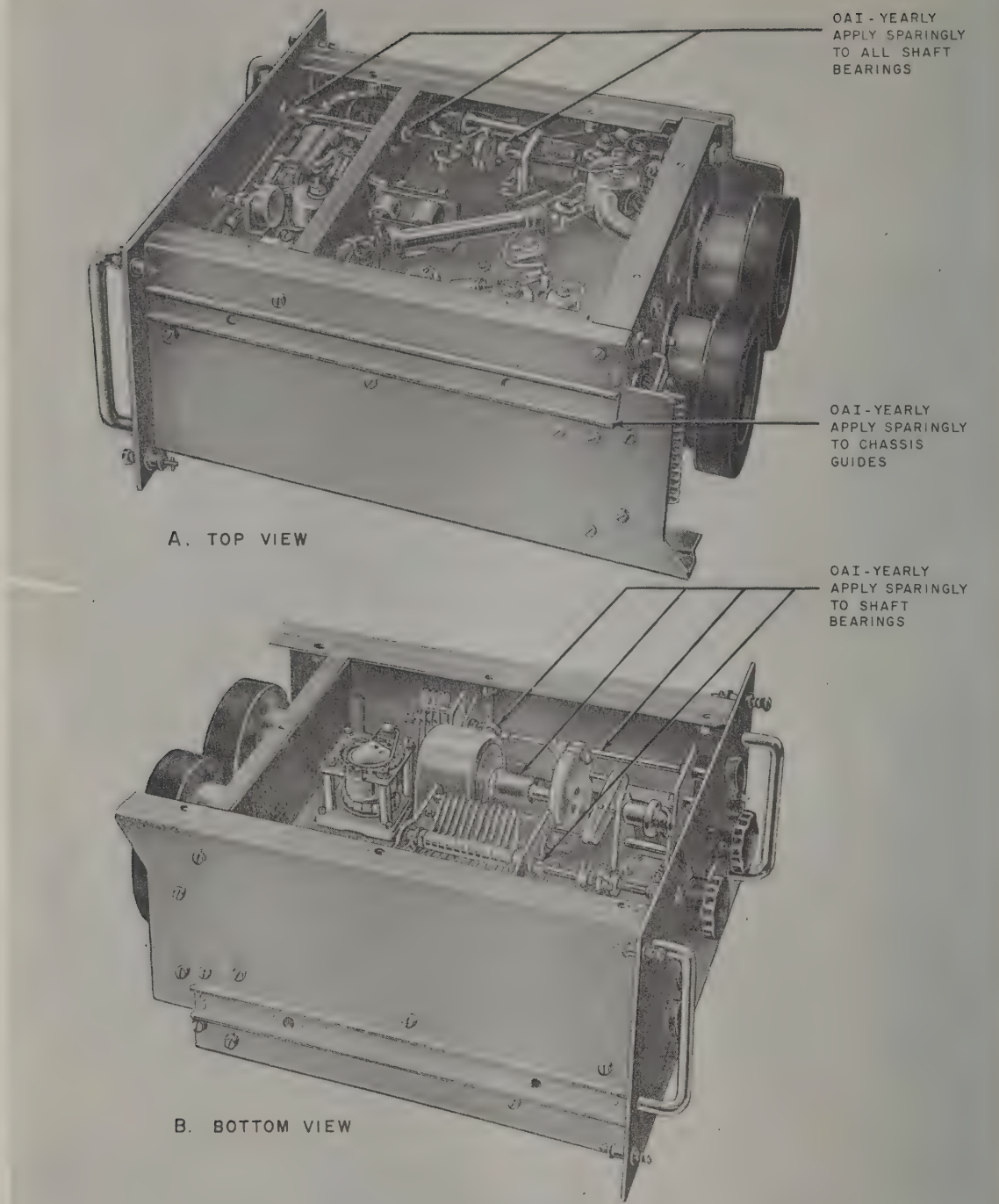
A. FRONT VIEW

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OA I	9150-257-5449

B. LUBRICANT TABLE

TM5820-287-20-46

Figure 46. PP–685(*)/TRC, lubrication points.

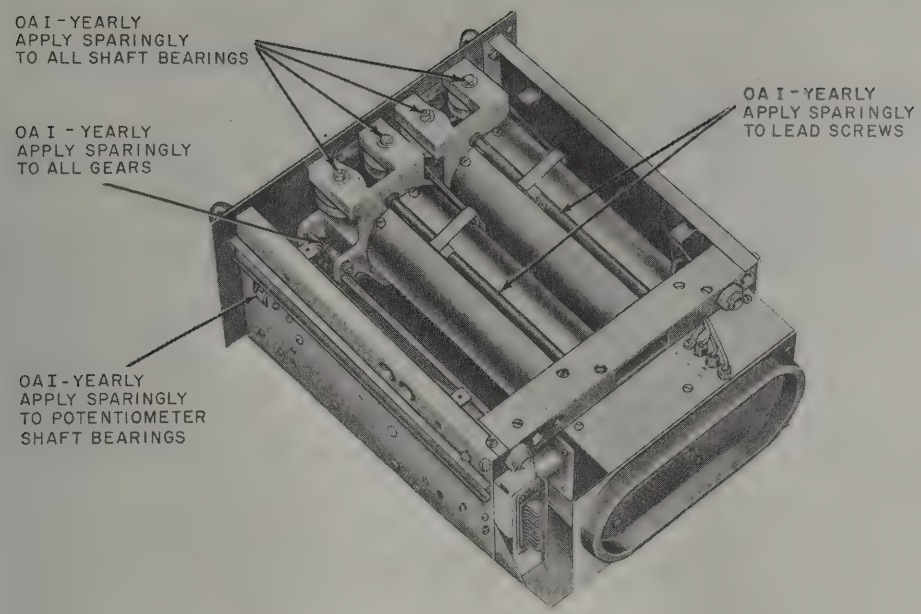


LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449

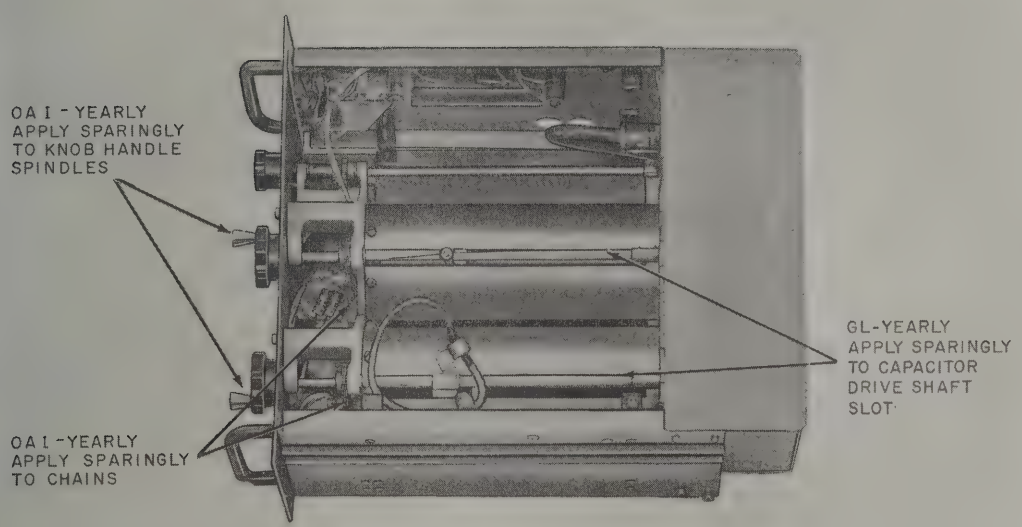
C. LUBRICANT TABLE

TM 5820-287-20-47

Figure 47. AM–1180/GRC (A-band), lubrication points.



A. TOP VIEW



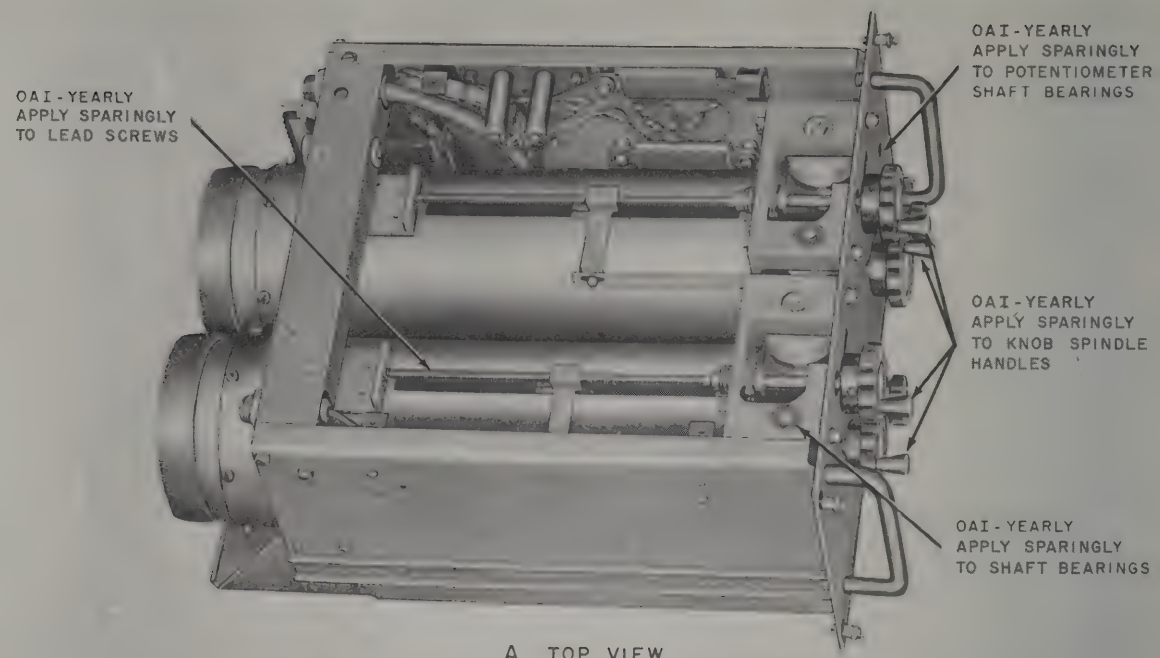
B. BOTTOM VIEW

LUBRICANT	SYMBOL	FEDERAL STOCK NO
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OA I	9150-257-5449
GREASE, AIRCRAFT AND INSTRUMENT MIL-G-3278	GL	9150-261-8297

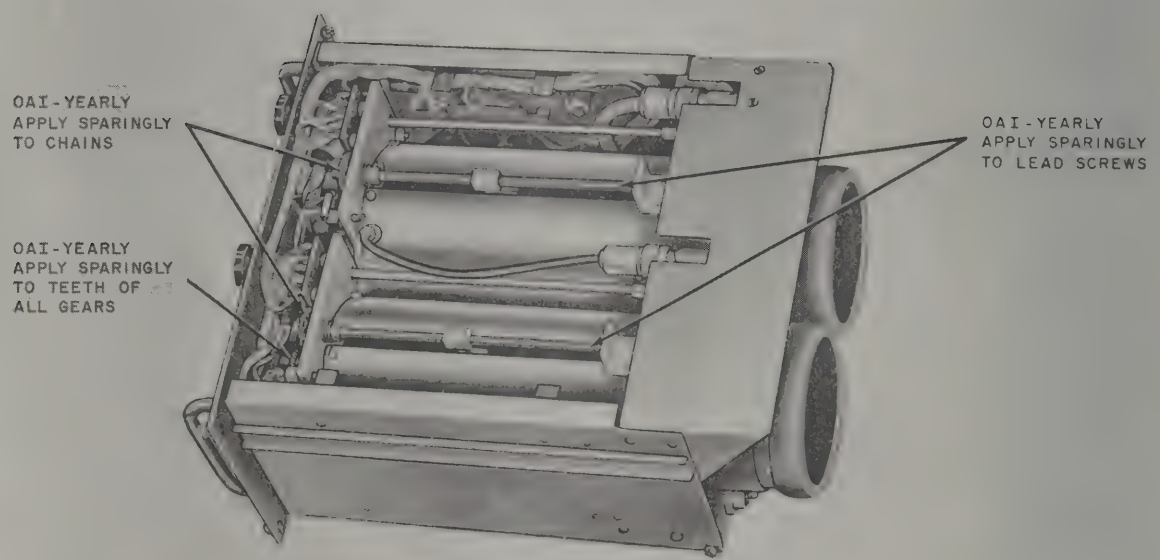
C. LUBRICANT TABLE

TM5820-287-20-48

Figure 48. AM–912(*)/TRC (B-band), lubrication points.



A. TOP VIEW



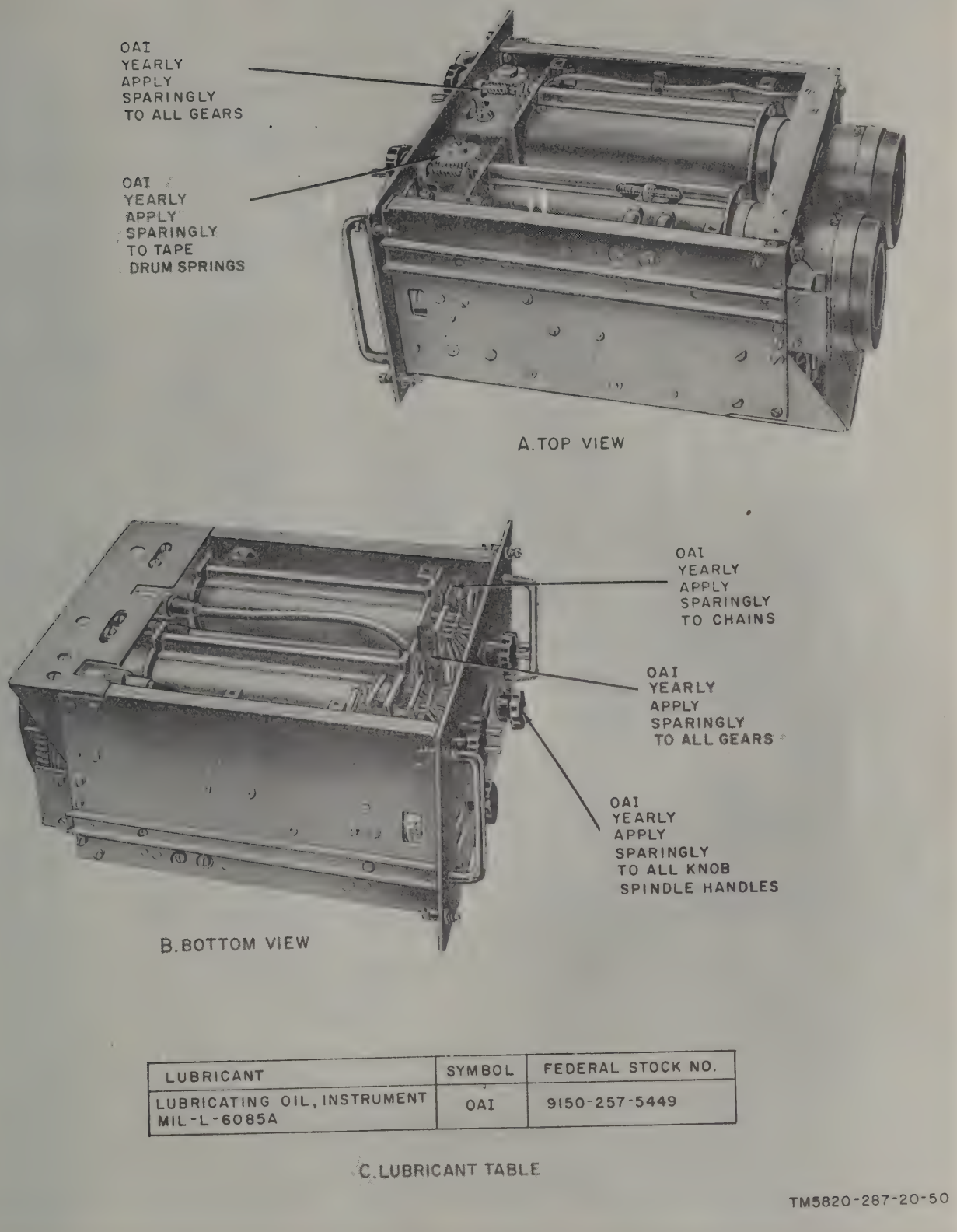
B. BOTTOM VIEW

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449

C. LUBRICANT TABLE

TM5820-287-20-49

Figure 49. AM–915(*)/TRC (C-band), lubrication points.

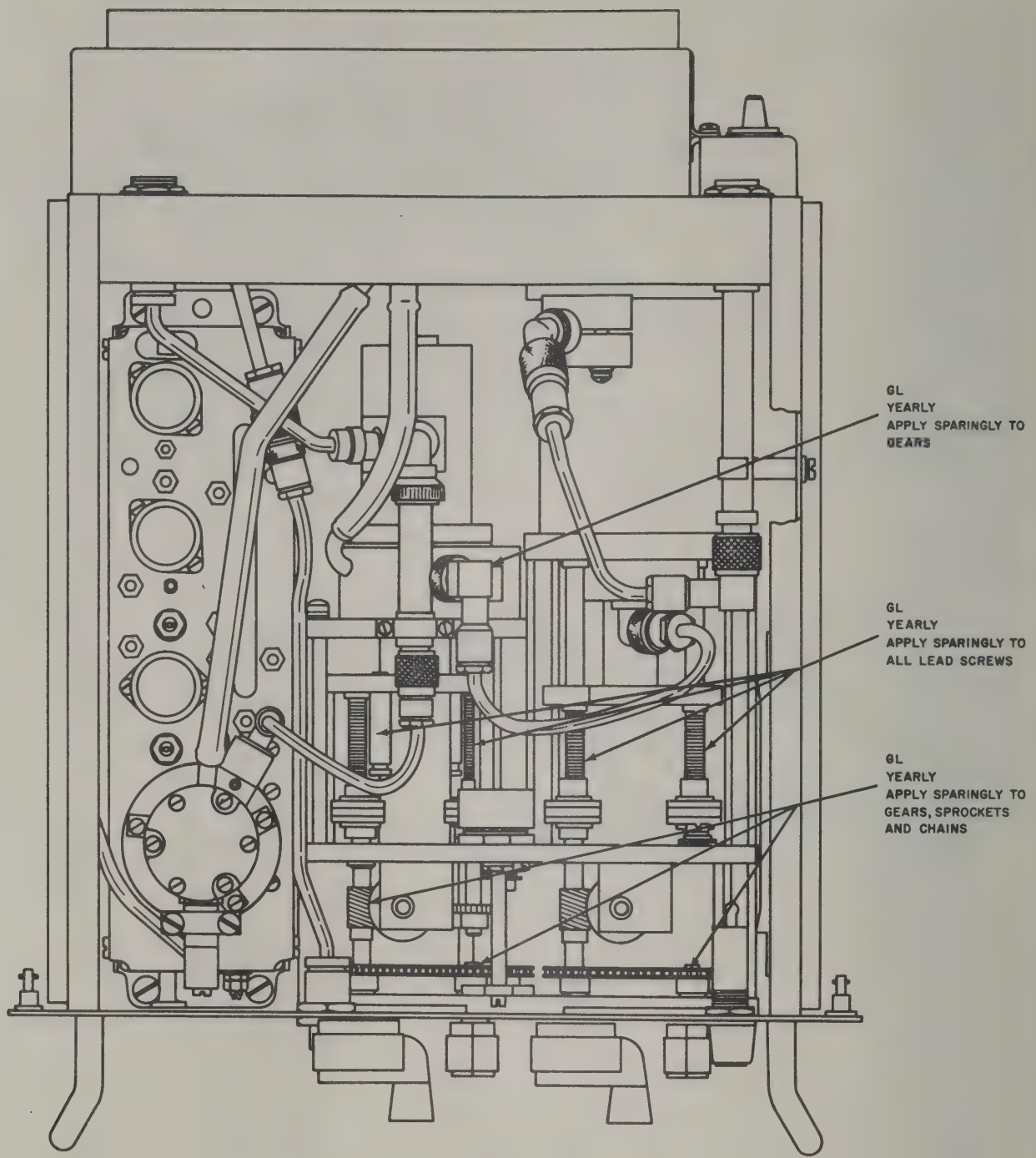


LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449

C. LUBRICANT TABLE

TM5820-287-20-50

Figure 50. AM–1178/GRC (D-band), lubrication points.



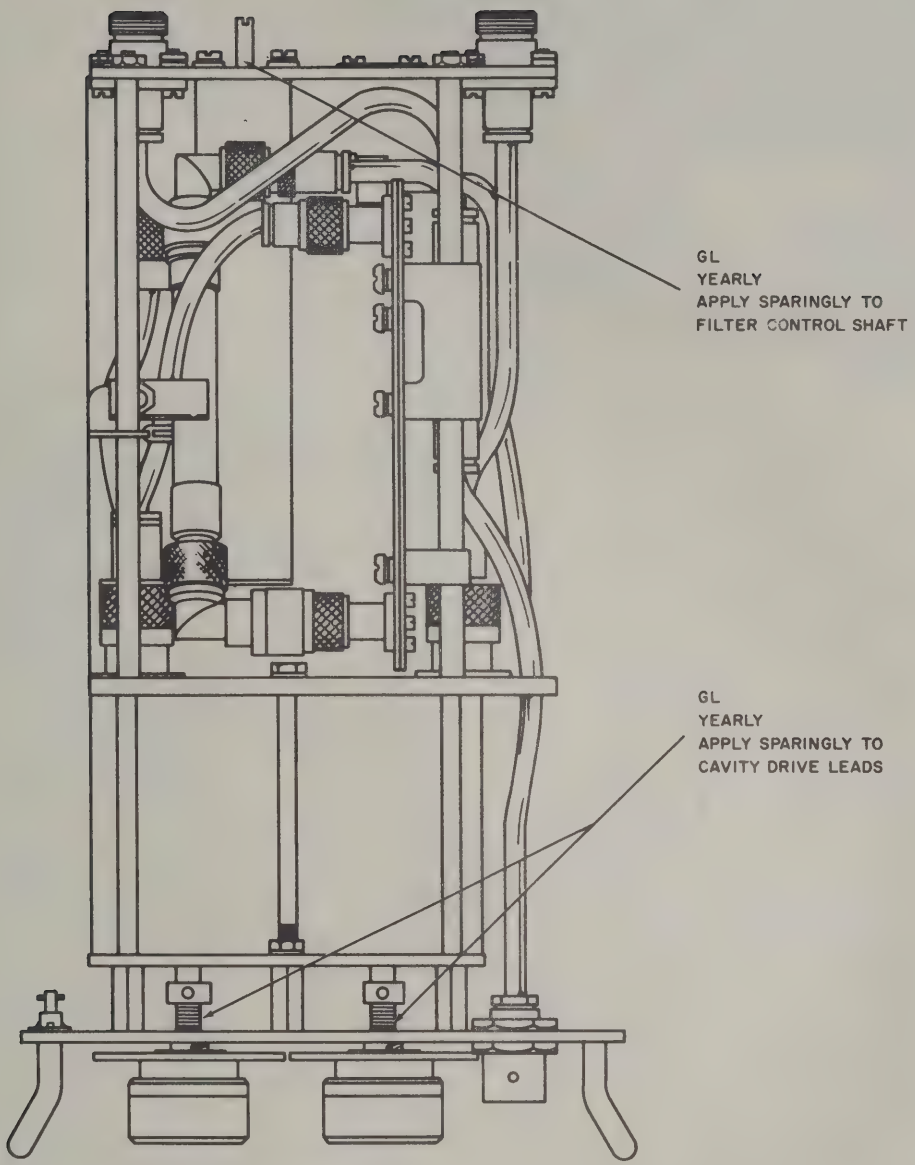
A. TOP VIEW

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
GREASE, AIRCRAFT AND INSTRUMENT MIL-G-3278	GL	9150-261-8297

B. LUBRICANT TABLE

TM5820-287-20-51

Figure 51. AM–2537/TRA–25 (F-band), lubrication points.



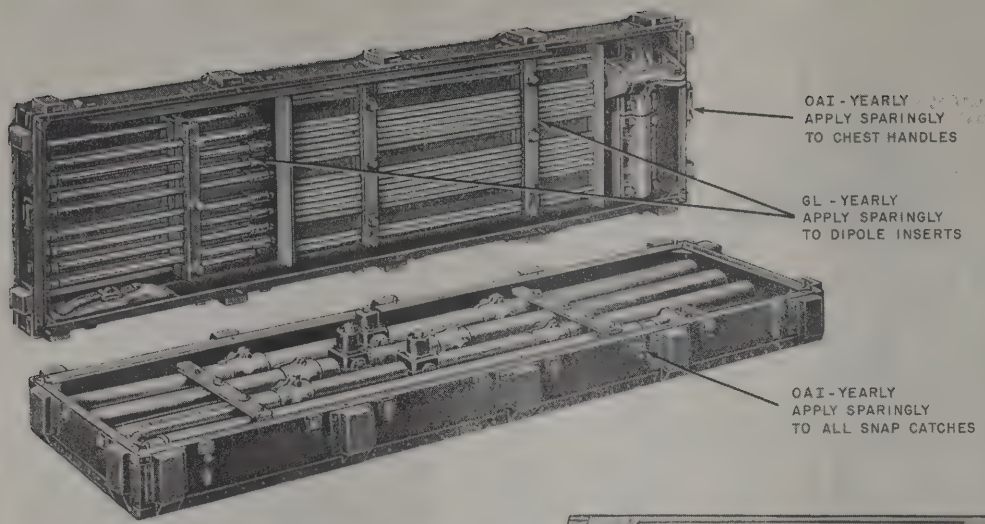
A. TOP VIEW

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
GREASE, AIRCRAFT AND INSTRUMENT MIL-G-3278	GL	9150-261-8297

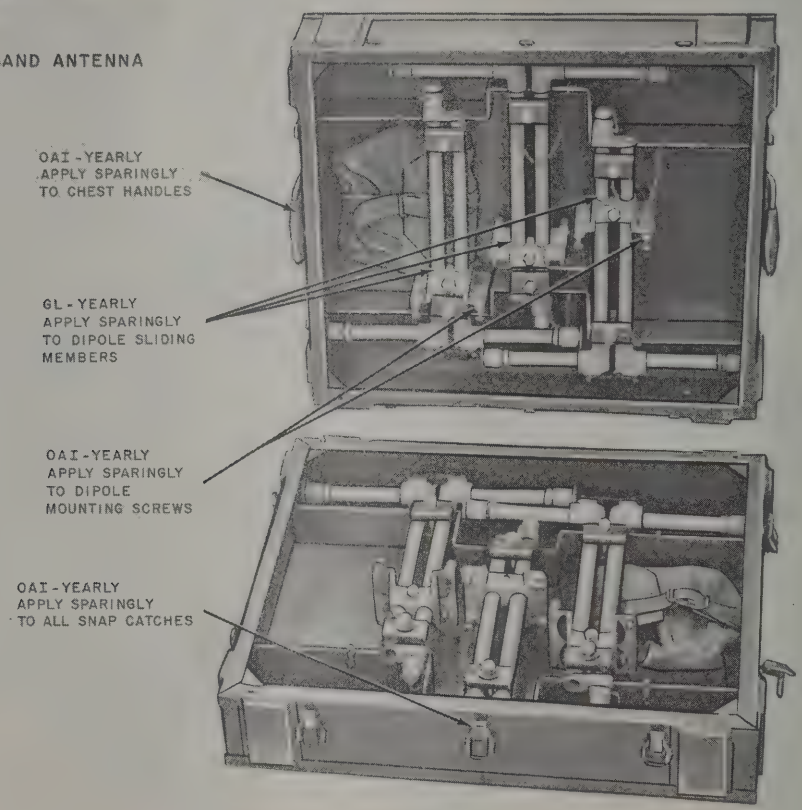
TM5820-287-20-52

B. LUBRICANT TABLE

Figure 52. CV–932/TRA–25 (F-band), lubrication points.



A. A-BAND ANTENNA



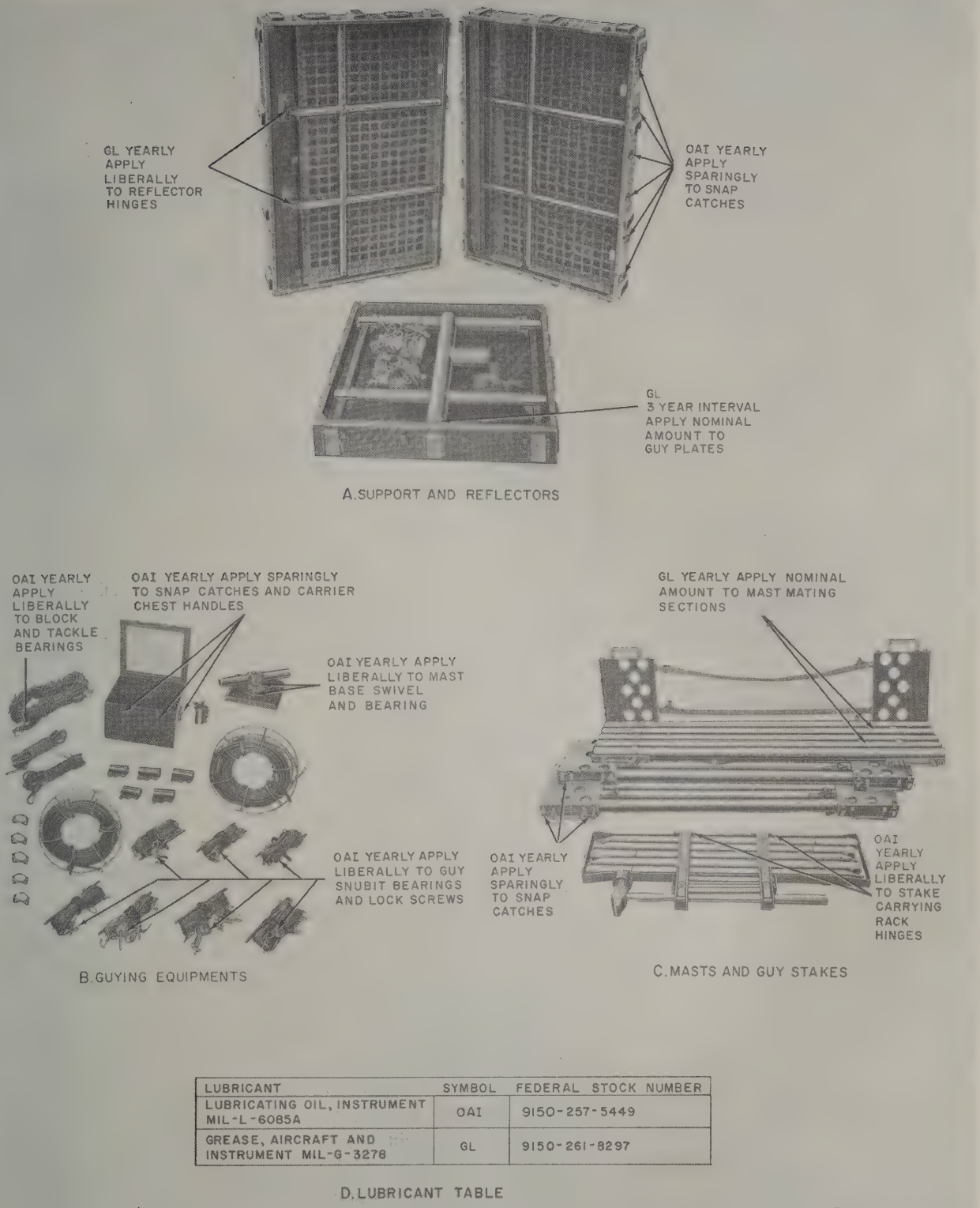
B. B, C, OR D BAND ANTENNA

LUBRICANT	SYMBOL	FEDERAL STOCK NO.
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449
GREASE, AIRCRAFT AND INSTRUMENT MIL-G-3278	GL	9150-261-8297

C. LUBRICANT TABLE

TM 5820-287-20-53

Figure 53. A-, B-, G-, or D-band antenna, lubrication points.


GL YEARLY APPLY LIBERALLY TO REFLECTOR HINGES
OAI YEARLY APPLY SPARINGLY TO SNAP CATCHES
GL 3 YEAR INTERVAL APPLY NOMINAL AMOUNT TO GUY PLATES
A. SUPPORT AND REFLECTORS
OAI YEARLY APPLY LIBERALLY TO BLOCK AND TACKLE BEARINGS
OAI YEARLY APPLY SPARINGLY TO SNAP CATCHES AND CARRIER CHEST HANDLES
OAI YEARLY APPLY LIBERALLY TO MAST BASE SWIVEL AND BEARING
OAI YEARLY APPLY LIBERALLY TO GUY SNUBIT BEARINGS AND LOCK SCREWS
B. GUYING EQUIPMENTS
GL YEARLY APPLY NOMINAL AMOUNT TO MAST MATING SECTIONS
OAI YEARLY APPLY SPARINGLY TO SNAP CATCHES
OAI YEARLY APPLY LIBERALLY TO STAKE CARRYING RACK HINGES
C. MASTS AND GUY STAKES

LUBRICANT	SYMBOL	FEDERAL STOCK NUMBER
LUBRICATING OIL, INSTRUMENT MIL-L-6085A	OAI	9150-257-5449
GREASE, AIRCRAFT AND INSTRUMENT MIL-G-3278	GL	9150-261-8297

D. LUBRICANT TABLE

TM5820-287-20-54

Figure 54. Antenna support parts, lubrication points.

b. Checklist.

	Item No.	Item	Action or condition	Normal indication	Corrective measure
PREPARATORY	1	Transmitter tuning heads: AM–1180/GRC (A-band) AM–912(*)/TRC (B-band) AM–915(*)/TRC (C-band) AM–1178/GRC (D-band) or AM–2537/TRA–25 (F-band).	Plug desired tuning head into T–302(*)/TRC and secure in place.		
	2	Receiver tuning head: AM–1179/GRC (A-band) AM–913/TRC (B-band) AM–914/TRC (C-band) AM–1177/GRC (D-band) or AM–913/TRC and CV–932/TRA–25 (F-band).	Plug desired tuning head into R–417(*)/TRC and secure in place.		
	3	Cables and equipment	Connect equipment for tuning and calibration (fig. 32, 33, or 34).	Connectors fit securely.	Repair or replace defective connector.
	4	POWER SUPPLY switch (SA–331/U).	Operate to No. 1		
	5	INCR OUT switch (TF–167/TRC).	Operate to 1		
	Note. Perform the procedures in 6 through 20 below for the T–302(*)/TRC.				
PREPARATORY	6	INPUT ADJ control	Operate to OFF		
	7	MEASURE switch	Operate to RF CHAN TUNE.		
	8	AFC switch	Operate to OFF		
	9	XTAL SEL switch	Operate to DECADE CHANS.		
	10	PULSED OSC switch	Operate to ODD CHANNELS for odd rf channel numbers or EVEN CHANNELS for even rf channel numbers.		
	11	TUNE control	Adjust until desired rf channel number appears under index pointer of odd channel dial or even channel dial.		
	12	INDEX control	Adjust until index pointer is centered in RF CHANNEL dial.		
	13	LOCK control	Turn completely counterclockwise.		
	14	RF CHANNEL TUNE control ..	Adjust until desired rf channel number is centered in RF CHANNEL dial.		

	Item No.	Item	Action or condition	Normal indication	Corrective measure
PREPARATORY	15	AFC control	Operate to 0		
	16	DRIVER TUNE control	Adjust until desired rf channel number is indicated under index pointer of driver channel dial.		
	17	DRIVER OUTPUT COUPLING control.	Adjust until DRIVER OUTPUT COUPLING dial indicates 3.		
	18	TEST switch	Operate to DRIVER CATH.		
	19	ALARM switch	Operate to OFF		
	20	THRESHOLD ADJ control	Turn completely counterclockwise.		
		Note. Perform the procedures in 21 and 22 below if the AM–1180/GRC (A-band) is installed in the T–302(*)/TRC.			
	21	PLATE TUNE control	Adjust until desired rf channel number appears under index pointer of plate tune dial.		
	22	OUTPUT COUPLING control	Operate to 6		
		Note. Perform the procedures in 23 through 25 below if the AM–912(*)/TRC (B-band) is installed in the T–302(*)/TRC.			
	23	GRID control	Adjust until desired rf channel number appears under index line of GRID dial.		
	24	PLATE control	Adjust until desired rf channel number appears under index line of PLATE dial.		
	25	AMPLIFIER OUTPUT COUPLING control.	Operate to 6		
		Note. Perform the procedures in 26 through 31 below if the AM–915(*)/TRC (C-band) is installed in the T–302(*)/TRC.			
PREPARATORY	26	Multiplier grid control	Adjust until desired rf channel number appears under index line of MULTIPLIER GRID dial.		
	27	Multiplier plate control	Adjust until desired rf channel number appears under index line of MULTIPLIER PLATE dial.		
	28	Power amplifier grid control	Adjust until desired rf channel number appears under index line of POWER AMPLIFIER GRID dial.		

Item No.	Item	Action or condition	Normal indication	Corrective measure
29	Power amplifier plate control	Adjust until desired rf channel number appears under index line of POWER AMPLIFIER PLATE dial.		
30	MULTIPLIER OUTPUT COUPLING control.	Operate to 6		
31	AMPLIFIER OUTPUT COUPLING control.	Operate to 6		
Note. Perform the procedures in 32 through 37 below if the AM-1178/GRC (D-band) is installed in the T-302(*)/TRC.				
32	MULTIPLIER control	Adjust until desired rf channel number appears under index line of GRID dial (left).		
33	Multiplier plate control	Adjust until desired rf channel number appears under index line of PLATE dial (left).		
34	POWER AMPLIFIER control	Adjust until desired rf channel number appears under index line of GRID dial (right).		
35	Power amplifier plate control	Adjust until desired rf channel number appears under index line of PLATE dial (right).		
36	MULTIPLIER OUTPUT COUPLING control.	Operate to 6		
37	AMPLIFIER OUTPUT COUPLING control.	Operate to 6		
Note. Perform the procedures in 38 through 41 below if the AM-2537/TRA-25 (F-band) is installed in the T-302(*)/TRC.				
38	Mixer tuning control	Adjust until desired rf channel number appears under index line of MIXER TUNE dial.		
39	Power amplifier tuning control	Adjust until desired rf channel number appears under index line of PA TUNE dial.		
40	MIXER COUPLING control	Operate to 6		
41	TEST MULT CATH switch	Operate to MIXER CATH.		

PREPARATORY

PREPARATORY

Item No.	Item	Action or condition	Normal indication	Corrective measure
	Note. Perform the procedures in 42 through 46 below for the R–417(*)/TRC.			
42	POWER circuit breaker	Operate to OFF		
43	MEASURE switch	Operate to B+		
44	SQUELCH control	Turn completely clockwise.		
45	ALARM switch	Operate to NOR		
46	OUTPUT ADJ control	Determine tuning head in use and operate to applicable setting indicated below. 25 (A-band) 19 (B-band) 15 (C-band) 12 (D-band) 19 (F-band)		
	Note. Perform the procedures in 47 through 49 below if the AM–1179/GRC (A-band) or AM–913/TRC (B-band) is installed in the R–417(*)/TRC.			
47	INDEX control	Adjust until index line is centered in RF AMP dial.		
48	Tuning control	Adjust until red calibration mark nearest desired rf channel number appears under index line of RF AMP dial.		
49	AFC control	Operate to 0		
	Note. Perform the procedures in 50 through 54 below if the AM–914/TRC (C-band) is installed in the R–417(*)/TRC.			
50	INDEX control	Adjust until index line is centered on OSC dial.		
51	COARSE PUSH TO TURN control.	Adjust until red calibration mark nearest desired rf channel number appears under index line of OSC dial.		
52	Tuning control	Adjust until rf channel number appearing under index line of OSC dial appears under index line of RF AMP dial.		
53	AFC control	Operate to 0		
54	FINE control	Operate to 0		

	Item No.	Item	Action or condition	Normal indication	Corrective measure
	Note. Perform the procedures in 55 through 58 below if the AM–1177/GRC (D-band) is installed in the R–417(*)/TRC.				
PREPARATORY	55	INDEX control	Adjust until index line is centered on OSC dial.		
	56	Oscillator tuning control	Adjust until red calibration mark nearest desired rf channel number is under index line of OSC dial.		
	57	Rf amplifier tuning control	Adjust until rf channel number indicated under index line of OSC dial is under index line of RF AMP dial.		
	58	AFC control	Operate to 0		
	Note. Perform the procedures in 59 through 61 below if the AM–913/TRC and CV–932/TRA–25 (F-band) are installed in the R–417(*)/TRC.				
	59	Mixer tuning dial	Adjust until desired rf channel number is aligned with index mark.		
	60	Antenna tuning dial	Adjust until desired rf channel number is aligned with index mark.		
	61	AM–913/GRC	Perform procedures in items 47, 48, and 49.		
	Note. Perform the procedures in 62 through 66 below for the PP–685(*)/TRC.				
	62	115V AC circuit breaker	Operate to OFF		
	63	750V ADJ control	Operate to 2		
	64	750V DC circuit breaker	Operate to OFF		
	65	150V DC circuit breaker	Operate to OFF		
	66	DC TEST switch	Operate to 150 UPPER SCALE.		
START	67	PU–286/G No. 1	Operate PU–286/G No. 1 (TM 11–940A).	Output meter indicates 120 volts.	Refer to TM 11–940A.
	68	115V AC circuit breaker (PP–685(*)/TRC).	Operate to ON	FIL (amber) indicator glows and AC VOLTS meter indicates approximately 115 volts.	Check fuses in TF–167/TRC. Replace lamp in FIL indicator. Replace fuse F5 (fig. 55).

	Item No.	Item	Action or condition	Normal indication	Corrective measure
START				Blower motor in T–302(*)/TRC operates and forces air out through front panel.	Check and repair cables from PU–286/G No. 1 to PP–685(*)/TRC (fig. 32, 33, or 34). Check cable from PP–685(*)/TRC to T–302(*)/TRC. Replace fuse F4 (fig. 55). Check air duct hose connections to blower motor (fig. 42) and replace air duct hose if necessary. Replace blower motor fan (fig. 56).
	69	INCR OUT switch (TF–167/TRC).	Adjust to obtain 115 volts ±5.5 on AC VOLTS meter of PP–685(*)/TRC.	AC VOLTS meter indicates 115 volts ±5.5.	
	70	150V DC circuit breaker (PP–685(*)/TRC).	Operate to ON	DC TEST meter indicates 150 volts and 150V DC (amber) indicator glows.	Adjust 150V ADJ control. Replace lamp in indicator. 150V DC Replace fuse F3 (fig. 55). Check tube V5, V6, V7, V8, V9 or V10 and replace defective tube.
	71	DC TEST switch (PP–685(*)/TRC).	Operate to 750 LOWER SCALE and allow one minute before proceeding.		
	72	750V DC circuit breaker (PP–685(*)/TRC).	Operate to ON	750V DC (amber) indicator glows and DC TEST meter indicates 650 volts ±25.	Replace lamp in 750V DC indicator. Replace fuse F1 (fig. 55). Check tube V1, V2, or V3, and replace defective tube (fig. 55).

Item No.	Item	Action or condition	Normal indication	Corrective measure
	Note. Perform the procedures in 73 through 91 for the T–302(*)/TRC.			
	XTAL SEL switch and DISCR CENTER control.	Operate and hold XTAL SEL switch to DISCR CENTER and adjust DISCR CENTER control until FREQ DRIFT meter indicates 0.	FREQ DRIFT meter indicates 0.	Check tube V114, V118, V119, V120, V121, V122, or V123 and replace defective tube (fig. 57).
74	XTAL SEL switch and RF CHANNEL TUNE control.	Operate XTAL SEL switch to DECADE CHANS and rotate RF CHANNEL TUNE control through a couple of channels and then set to desired rf channel number and maximum indication on MEASURE meter.	MEASURE meter indicates maximum at each channel interval.	Check tube V115 and replace if necessary (fig. 57).
75	INDEX control	Adjust until index pointer of RF CHANNEL dial is over desired rf channel number.		
76	LOCK control	Turn completely clockwise.		
77	XTAL SEL switch and TUNE control.	Operate XTAL SEL switch to UNIT CHANS and rotate TUNE control through a couple of channels and then set to desired rf channel number.	MEASURE meter indicates maximum at each channel interval.	Check tube V113, V114, V116, or V117 (fig. 57) and replace defective tube.
78	MEASURE switch	Operate to 1 KC ADJ ..		
79	1 KC ADJ control	Adjust for 0-db indication on MEASURE meter.	MEASURE meter indicates 0 db.	Check tube V104 (fig. 57) and replace if necessary.
80	MEASURE switch	Operate to MTR CAL ..		
81	MTR CAL control	Adjust for 0-db indication on MEASURE meter.	MEASURE meter indicates 0 db.	Check tube V103 (fig. 57) and replace if necessary.
82	MEASURE switch	Operate to DISCR RF DRIVE.		
83	DISCR RF DRIVE control	Adjust for maximum indication on MEASURE meter.	MEASURE meter indicates maximum.	Check tube V122 or V123 (fig. 57) and replace if necessary.

	Item No.	Item	Action or condition	Normal indication	Corrective measure
EQUIPMENT PERFORMANCE	84	MEASURE switch	Operate to MOD ADJ ..		
	85	MOD ADJ control	Adjust for 0-db indication on MEASURE meter.	MEASURE meter indicates 0 db.	
	86	MTR SENS switch and MOD TRIM control.	Operate and hold MTR SENS switch to INCR and adjust MOD TRIM control for maximum indication on MEASURE meter.	MEASURE meter indicates maximum.	
	87	MOD ADJ control	Adjust for correct indication on MEASURE meter determined by tuning head: +2 db (A-band) +2 db (B-band) 0 db (C-band) 0 db (D-band) +2 db (F-band)	Correct indication is obtained on MEASURE meter.	
	88	DC TEST switch (PP–685(*)/TRC).	Operate to 275 LOWER SCALE.		
	89	SCREEN VOLTS ADJUST control A-, B-, C- or D-band (350V control, F-band) on tuning head.	Adjust for minimum indication (350 volts, F-band) on DC TEST meter (PP–685(*)/TRC).	Correct indication is obtained on DC TEST meter.	Check tube V4 (fig. 55) and replace if necessary.
	90	DC TEST switch (PP–685(*)/TRC).	Operate to 750 LOWER SCALE.		
	91	750 ADJ control	Operate to 1	DC TEST meter indicates 300 volts ±20.	
	Note. Perform the procedures in 92 through 100 if the AM–1180/GRC (A-band) is installed in the T–302(*)/TRC.				
	92	TEST switch (T–302(*)/TRC) ..	Operate to PWR AMPL GRID.		
	93	DRIVER TUNE and DRIVER OUTPUT COUPLING controls.	Adjust for maximum indication on TEST meter.	TEST meter indicates maximum.	Check tube V101, V102, V104, (fig. 57) V105, V106, V107, V109, or V110 (B fig. 56) and replace defective tube.

	Item No.	Item	Action or condition	Normal indication	Corrective measure
EQUIPMENT PERFORMANCE	94	PLATE TUNE and OUTPUT COUPLING controls (AM–1180/GRC).	Adjust for maximum indication on ME–82/U.	ME–82/U indicates maximum.	Check cable from ANTENNA connector of T–302(*)/TRC to ME–82/U. Check tube V1 (fig. 58) and replace if necessary.
	95	750V ADJ switch (PP–685(*)/TRC).	Operate to 5	DC TEST meter indicates 800 volts ±35.	
	96	TEST switch (PP–685(*)/TRC)	Operate to PWR AMPL CATH.		
	97	SCREEN VOLTS ADJ control (AM–1180/GRC).	Adjust for 21 microampere indication on TEST meter (T–302(*)/TRC).	TEST meter indicates 21 microamperes.	
	98	TEST switch (T–302(*)/TRC) ..	Operate to PWR AMPL GRID.		
	99	DRIVER TUNE control	Adjust for maximum indication on TEST meter.	TEST meter indicates maximum.	
	100	DRIVER OUTPUT COUPLING control.	Adjust for more than 25 microamperes indication on TEST meter or until control is completely clockwise.	TEST meter indicates more than 25 microamperes and ME–82/U indicates between 60 to 100 watts.	
	Note. Perform the procedures in 101 through 111 if the AM–912(*)/TRC (B-band) is installed in the T–302(*)/TRC.				
	101	DRIVER OUTPUT COUPLING control (T–302(*)/TRC).	Adjust until DRIVER OUTPUT COUPLING dial indicates two numbers higher than original setting.		
	102	TEST switch.	Operate to DRIVER CATH.		
	103	DRIVER TUNE control.	Adjust for dip on TEST meter.	TEST meter indicates dip.	Check tube V101, V102, V104, (fig. 57) V105, V106, V107, V108, V109, or V110 (B fig. 56) and replace defective tube.
	104	TEST switch.	Operate to PWR AMPL GRID.		

	Item No.	Item	Action or condition	Normal indication	Corrective measure
EQUIPMENT PERFORMANCE	105	GRID control (AM–912(*)/TRC).	Adjust for maximum indication on TEST meter.	TEST meter indicates maximum.	Check tube V1 (fig. 59) and replace if necessary.
	106	750V ADJ control (PP–685(*)/TRC).	Operate to 2	DC TEST meter indicates 650 ±25.	
	107	DRIVER TUNE control	Adjust for maximum indication on TEST meter.	TEST meter indicates maximum.	
	108	DRIVER OUTPUT COUPLING control.	Adjust for 20-microampere indication on TEST meter.	TEST meter indicates 20 microamperes.	
	109	PLATE and AMPLIFIER OUTPUT COUPLING controls (AM–912(*)/TRC).	Adjust for maximum indication on ME–82/U.	ME–82/U indicates maximum.	Check cable from ANTENNA connector of T–302(*)/TRC to ME–82/U.
	110	DC TEST switch (PP–685(*)/TRC).	Operate to 750 LOWER SCALE.		
	111	750V ADJ switch	Operate to 6	DC TEST meter indicates 850 volts ±35 and ME–83/U indicates from 70 to 115 watts.	
		Note. Perform the procedures in 112 through 123 if the AM–915(*)/TRC (C-band) is installed in the T–302(*)/TRC.			
	112	TEST switch (T–302(*)/TRC) ..	Operate to DRIVER CATH.		
	113	DRIVER OUTPUT COUPLING control.	Adjust until DRIVER OUTPUT COUPLING dial indicates two numbers higher than original setting.		
	114	DRIVER TUNE control	Adjust for dip on TEST meter and maximum indication on ME–82/U.	TEST meter indicates dip and ME–82/U indicates maximum.	Check tube V101, V102, V104, (fig. 57) V105, V106, V107, V108, V109, and V110 (B, fig. 56) and replace defective tube.
	115	TEST switch	Operate to MULT GRID.		
	116	Multiplier grid control (AM–915(*)/TRC).	Adjust for maximum indication on T–302(*)/TRC TEST meter.	TEST meter indicates maximum.	Check tube V1 or V2 (fig. 60) and replace if necessary.

	Item No.	Item	Action or condition	Normal indication	Corrective measure
EQUIPMENT PERFORMANCE	117	DRIVER OUTPUT COUPLING control (T–302(*)/TRC).	Adjust to provide 20-microampere indication on TEST meter.	TEST meter indicates 20 microamperes.	
	118	MULTIPLIER OUTPUT COUPLING control (AM–915(*)/TRC).	Operate to two positions higher than original setting.		
	119	TEST switch (T–302(*)/TRC)..	Operate to MULT CATH.		
	120	Multiplier plate control (AM–915(*)/TRC).	Adjust for dip on T–302(*)/TRC TEST meter.	TEST meter indicates dip and ME–82/U indicates maximum.	
	121	Power amplifier grid, power amplifier plate, and AMPLIFIER OUTPUT COUPLING controls.	Adjust for maximum indication on ME–82/U.	ME–82/U indicates maximum.	
	122	DC TEST switch (PP–685(*)/TRC).	Operate to 750 LOWER SCALE.		
	123	750V ADJ switch	Operate to 4	DC TEST meter indicates 750 volts ±30 and ME–82/U indicates from 70 to 115 watts.	
	Note. Perform the procedures in 124 through 132 if the AM–1178/GRC (D-band) is installed in the T–302(*)/TRC.				
	124	TEST switch (T–302(*)/TRC) ..	Operate to MULT GRID.		
	125	DRIVER TUNE control	Adjust for maximum indication on TEST meter.	TEST meter indicates maximum.	Check Tube V101, V102, V104, (fig. 57) V105, V106, V107, V108, V109, or V110 (B, fig. 56) and replace defective tube.
	126	MULTIPLIER control (AM–1178/GRC).	Adjust for maximum indication on T–302(*)/TRC TEST meter.	TEST meter indicates maximum.	Check tube V1 or V2 (fig. 61) and replace defective tube.
	127	Power amplifier plate control	Adjust for maximum indication on ME–82/U.	ME–82/U indicates maximum.	Check cable from ANTENNA connector of T–302(*)/TRC to ME–82/U.
	128	DC TEST switch (PP–685(*)/TRC).	Operate to 750 LOWER SCALE.		
	129	750V ADJ control	Operate to 4	DC TEST meter indicates from 50 to 100 watts.	

Item No.	Item	Action or condition	Normal indication	Corrective measure
130	Multiplier plate and POWER AMPLIFIER controls (AM–1178/GRC).	Adjust for maximum indication on ME–82/U.	ME–82/U indicates maximum.	
131	DRIVER OUTPUT COUPLING control (T–302(*)/TRC).	Adjust for 30- to 45-microampere indication on TEST meter.	TEST meter indicates from 30 to 45 microamperes.	
132	MULTIPLIER, multiplier plate, POWER AMPLIFIER, and power amplifier plate control (AM–1178/GRC).	Adjust for maximum indication on ME–82/U.	ME–82/U indicates from 50 to 100 watts.	
	Note. Perform the procedures in 133 through 139 if the AM–2537/TRA–25 (F-band) is installed in the T–302(*)/TRC.			
133	DC TEST switch (PP–685(*)/TRC).	Operate to 750 LOWER SCALE.		
134	750V ADJ switch	Operate to 6	DC TEST meter indicates 850 volts ±35.	
135	TEST switch (T–302(*)/TRC).	Operate to MULT CATH.		
136	TEST MULT CATH switch (AM–2537/TRA–25).	Operate to MIXER CATH.		
137	DRIVER TUNE control (T–302(*)/TRC).	Adjust for dip on TEST meter.	TEST meter indicates dip.	Check tube V101, V102, V104, (fig. 57) V105, V106, V107, V108, V109, or V110 (fig. 56) and replace defective tube.
138	DRIVER OUTPUT COUPLING control.	Adjust for 30 microampere indication on TEST meter.	TEST meter indicates 30 microamperes.	Check tube V101, V102, V104, (fig. 57) V105, V106, V107, V108, V109, or V110 (B, fig. 56) and replace defective tube.
139	Mixer tuning, MIXER COUPLING and power amplifier tuning controls (AM–2537/TRA–25).	Adjust for maximum indication on ME–82/U.	ME–82/U indicates above 10 watts.	Check tube V301, V302, V303, V304, or V401 (fig. 62) and replace defective tube.
	Note. Perform the procedures in 140 through 152 on the T–302(*)/TRC.			
140	750V DC switch (PP–685(*)/TRC).	Operate to OFF	750V DC indicator extinguishes.	
141	ME–82/U (fig. 33, 34, or 35)	Disconnect CG–718/U from ANTENNA connector of T–302(*)/TRC and connect CG–1030/U (CG–1886/U, F-band) in its place.		
142	TEST switch (T–302(*)/TRC) ..	Operate to FWD PWR..		
143	750V DC switch (PP–685(*)/TRC).	Allow 1 minute delay and operate to ON.	750V DC indicator glows.	

	Item No.	Item	Action or condition	Normal indication	Corrective measure
EQUIPMENT PERFORMANCE	144	DRIVER TUNE control (T–302(*)/TRC).	Note indication on TEST meter and adjust to 70 percent of noted indication.	Indication on TEST meter decreases to 70 percent of previous indications.	
	145	ALARM switch	Operate to NOR.		
	146	THRESHOLD ADJ control	Rotate counterclockwise until LOW PWR ALARM indicator glows and buzzer sounds.	LOW PWR ALARM indicator glows and buzzer sounds.	Replace LOW PWR ALARM indicator lamp. Check tube V111 or V112 (A, fig. 56) and replace defective tube.
	147	DRIVER TUNE control	Adjust for maximum indication on ME–82/U.	ME–82/U indicates maximum, LOW PWR ALARM indicator extinguishes, and buzzer no longer sounds.	
	148	ALARM switch	Operate to REV	Buzzer sounds.	
	149	DRIVER TUNE control	Repeat procedures in item 144 above.	LOW PWR ALARM indicator glows and buzzer does not sound.	
	150	ALARM switch and DRIVER TUNE control.	Operate ALARM switch to NOR and adjust DRIVER TUNE control for maximum indication on ME–82/U.	ME–82/U indicates maximum and LOW PWR ALARM indicator extinguishes.	
	151	AFC switch	Operate to ON.		
	152	AFC control	Operate to +4 and release.	FREQ DRIFT meter deflects to positive portion of scale and returns to 0.	Check tube V124 or V125 (fig. 57) and replace defective tube.
			Operate to —4 and release.	FREQ DRIFT meter deflects to negative portion of scale and returns to 0.	
	Note. Perform the procedures in 153 through 163 for the R–417(*)/TRC.				
	153	POWER circuit breaker	Operate to ON and allow 10 minutes warmup time before proceeding.	POWER indicator glows and MEASURE meter indicates 30 microamperes when tubes warm up.	Check cable from REC connector of TF–167/TRC to AC POWER connector of R–417(*)/TRC (fig. 32, 33, or 34). Replace fuse F101 (B, fig. 35). Replace lamp in POWER indicator. Adjust 150V ADJ control (B, fig. 35).

	Item No.	Item	Action or condition	Normal indication	Corrective measure
					Check tube V116, V117, V118, V119, or V120 (B, fig. 63) and replace defective tube.
	154	MEASURE switch	Operate to MTR CAL.		
	155	MEASURE switch (T–302(*)/TRC).	Operate to 1KC ADJ ..	MEASURE meter R–417(*)/TRC indicates 0 db ±0.5.	Adjust ADJ METER control (A, fig. 35). Check tube V125 (fig. 63) and replace if necessary.
	156	MEASURE switch (R–417(*)/TRC).	Operate to OSC	MEASURE meter indicates 10 microamperes or higher.	Check applicable tube in receiver tuning head and replace if necessary. AM–1179/GRC (V2, fig. 65). AM–913/TRC (V2, fig. 66). AM–914/TRC (V4, fig. 67). AM–1177/GRC (V4, fig. 68).
EQUIPMENT PERFORMANCE	157	MEASURE switch	Operate to MIX (B-, C-, or F-band only).	MEASURE meter indicates 10 microamperes or higher.	Check applicable tube in receiver tuning head and replace if necessary. AM–913/TRC (V2, fig. 66). AM–914/TRC (V3, fig. 67). CV–932/TRA–25 (1N21ER, fig. 69).
	158	MEASURE switch	Operate to 1ST LIM ..	MEASURE meter indicates 5 microamperes.	Check tube V101, V102, V103, V104, V105, V106, or V107 (fig. 63) or applicable tube in receiver tuning head. AM–1179/GRC (V1, V2, or V3, fig. 65). AM–913/TRC (V1 or V2, fig. 66). AM–914/TRC (V1, V2, or V3, fig. 67). AM–1177/GRC (V1, V2, or V3, fig. 68).

	Item No.	Item	Action or condition	Normal indication	Corrective measure
EQUIPMENT PERFORMAECE					Check cable from REC OSC connector of AM–2537/TRA–25 to REC OSC connector of CV–932/TRA–25 (fig. 33).
	159	MEASURE switch	Operate to 2ND LIM ..	MEASURE meter indicates 25 microamperes.	Check tube V109 (A, fig. 63) and replace if necessary.
	160	MEASURE switch	Operate to AFC BAL.		
	161	AFC DISABLE switch	Operate and hold to on position.	MEASURE meter indicates less than 2 microamperes.	Adjust AFC BAL control (A, fig. 35).
					Check tube V110, V111, V112, V113, V114, or V115 (A, fig. 63) and replace defective tube.
	162	AFC DISABLE switch	Release.		
	163	MEASURE switch	Operate to 2ND LIM.		
	Note. Perform the procedures in 164 through 168 if the AM–1179/GRC (A-band) or AM–913/TRC (B-band) is installed in the R–417(*)/TRC.				
	164	SQUELCH control (R–417(*)/TRC).	Turn counterclockwise until MEASURE meter indicates 5 microamperes.	MEASURE meter indicates 5 microamperes, ALARM indicator glows, and buzzer sounds.	Check tube V125 (A, fig. 63) and replace if necessary.
	165	ALARM switch	Operate to REV.		
	166	AFC-OFF-CAL switch	Operate and hold to CAL.		
	167	Tuning control (AM–1179/GRC or AM–913/TRC).	Adjust for maximum indication on MEASURE meter and 0 on frequency DRIFT meter and release AFC-OFF-CAL switch.	MEASURE meter indicates maximum, FREQ DRIFT meter indicates 0, and buzzer sounds. When AFC-OFF-CAL switch is released, buzzer no longer sounds.	
	168	INDEX control	Adjust until index line is over red calibration mark nearest desired rf channel number.		
	Note. Perform the procedures in 169 through 175 if the AM–914/TRC (C-band) is installed in the R–147(*)/TRC.				
	169	SQUELCH control (R–417(*)/TRC).	Turn counterclockwise until MEASURE meter indicates 5 microamperes.	MEASURE meter indicates 5 microamperes, ALARM indicator glows, and buzzer sounds.	Check tube V125 (A, fig. 63) and replace if necessary.

EQUIPMENT PERFORMANCE

Item No.	Item	Action or condition	Normal indication	Corrective measure
170	Tuning Control (AM–914/TRC)..	Adjust for maximum indication on MEASURE meter.	MEASURE meter indicates maximum.	
171	SQUELCH control (R–417(*)/TRC).	Adjust so indication on MEASURE meter does not exceed 30 microamperes.	MEASURE meter indication does not exceed 30 microamperes.	
172	AFC-OFF-CAL switch	Operate and hold to CAL.		
173	FINE control (AM–914/TRC) ..	Adjust for maximum indication on MEASURE meter and 0 indication on FREQ DRIFT meter and release AFC-OFF-CAL switch.	MEASURE meter indicates maximum and FREQ SHIFT meter indicates 0.	
174	INDEX control	Adjust until index line is over red calibration line nearest desired rf channel number on OSC dial.		
175	Tuning control	Adjust until desired rf channel number is directly under index line of RF AMP dial.		
Note. Perform the procedures in 176 through 183 if the AM–1177/GRC (D-band) is installed in the R–417(*)/TRC.				
176	AFC-OFF-CAL switch (R–417(*)/TRC).	Operate and hold to CAL.		
177	Oscillator tuning control (AM–1177/GRC).	Adjust for 0 indication on FREQ DRIFT meter.	FREQ DRIFT meter indicates 0.	
178	Rf amplifier tuning control	Adjust for maximum indication on MEASURE meter.	MEASURE meter indicates maximum.	
179	FINE TUNE control	Adjust for maximum indication on MEASURE meter and release AFC-OFF-CAL switch.	MEASURE meter indicates maximum.	
180	Oscillator tuning control	Adjust until desired rf channel number is under index line of OSC dial.		
181	Rf amplifier tuning control	Adjust until desired rf channel number is under index line of RF AMP dial.		
182	FINE TUNE control	Adjust for maximum indication on MEASURE meter.	MEASURE meter indicates maximum.	
183	Rf amplifier tuning control	Adjust for maximum indication on MEASURE meter.		
Note. Perform the procedures in 184 through 186 if the AM–913/TRA–25 (F-band) is installed in the R–417(*)/TRC.				

Item No.	Item	Action or condition	Normal indication	Corrective measure
184	Items 164 through 168	Perform procedures in items 164 through 168 for the AM–913/TRC.		
185	Mixer tuning dial (CV–932/TRA–25).	Adjust for maximum indication on MEASURE meter.	MEASURE meter indicates maximum.	
186	Antenna tuning dial	Adjust for maximum indication on MEASURE meter.	MEASURE meter indicates maximum.	
	Note. Perform the procedures in 187 through 204 on the R–417(*)/TRC.			
187	ANTENNA connector	Disconnect the CG–1031/U from the ANTENNA connector and connect the CG–718/U and the ME–82/U in its place (fig. 32, 33, or 34).		
188	ALARM switch	Operate to NOR.		
189	SQUELCH control	Rotate counterclockwise to point where ALARM indicator glows and buzzer sounds.	ALARM indicator glows and buzzer sounds.	
190	ALARM switch	Operate to REV.		
191	AFC-OFF-CAL switch	Operate to AFC.		
192	ANTENNA connector	Disconnect CG–718/U from ANTENNA connector and connect CG–1030/U (CG–1886/U, F-band) in its place (fig. 32, 33, or 34).		
193	ALARM switch	Operate to NOR when buzzing indicates presence of signal.		
194	MEASURE switch	Operate to SIG LEV ..	MEASURE meter indicates 30 microamperes.	Check tube V108 (A, fig. 63) and replace if necessary.
195	MEASURE switch	Operate to 1KC OUT (4-channel carrier system) or 68KC OUT (12-channel carrier system).	MEASURE meter indicates 0 db ±0.5.	Check tube V121, V122, V123, or V124 (A, fig. 63) and replace defective tube.
196	TALK-RING switch	Operate to RING	RING indicator glows and buzzer sounds.	Replace RING indicator lamp. Check tube V127, V128, or V129 (A, fig. 63) and replace defective tube.
197	MEASURE switch	Operate to 1KC OUT.		

	Item No.	Item	Action or condition	Normal indication	Corrective measure
EQUIP. PERF.	198	H–90/U	Talk into microphone section.	MEASURE meter on R–417(*)/TRC indicates transmission.	Check tube V129 (A, fig. 63) and replace if necessary.
	199	H–90/U	Listen to headphone section.	Order-wire signals are received.	Check tube V126 (A, fig. 63) and replace if necessary.
STOP	200	POWER circuit breaker (R–417(*)/TRC).	Operate to OFF	POWER indicator extinguishes and blower motor stops.	
	201	750V DC circuit breaker (PP–685(*)/TRC).	Operate to OFF	750V DC indicator extinguishes.	
	202	150V DC circuit breaker	Operate to OFF	150V DC indicator extinguishes.	
	203	115V AC circuit breaker	Operate to OFF	115V AC indicator extinguishes and T–302(*)/TRA blower motor stops.	
	204	PU–286/G No. 1	Stop PU–286/G No. 1 (TM 11–940A).		

Section III. REPAIRS

50. Tube Testing and Replacement

a. Tube Testing Techniques. When trouble occurs, check all cabling, connections, and fuses before removing any tubes. Try to isolate the trouble to a component or stage. If tube failure is suspected, use the applicable procedures below to check the tubes.

***Caution:* Never rock or rotate a tube when removing it from a socket; pull it straight out with a tube puller.**

(1) *Using tube tester.* Remove and test one tube (fig. 55 through 69) at a time. Discard a tube only if its defect is obvious or if the tube tester shows it to be defective. Do not discard a tube that tests at or slightly below its minimum test limit. Replace the original tube, or install a new one if required, before testing the next one.

(2) *Tube substitution method.* Replace a suspected tube with a new tube. If this does not correct the trouble, remove the new tube and replace the original tube. Repeat this procedure with each suspected tube until the defective tube is located.

b. Preferred-Type Tubes. Preferred-type tubes are used in this equipment; *do not* use a nonpreferred-type tube to replace a preferred-type tube.

51. Replacement of Air Filter (R–417(*)/TRC or PP–685(*)/TRC)

(fig. 70 and 71)

a. Removal.

(1) Loosen the camlock fasteners that secure the filter clamp to the rear of the chassis and remove the filter clamp.

(2) Remove the air filter from the chassis.

b. Cleaning.

(1) Wash the air filter with cleaning compound.

(2) Drain and dry thoroughly.

c. Replacement.

(1) Replace the air filter with the arrow pointing toward the front panel (in the direction of airflow).

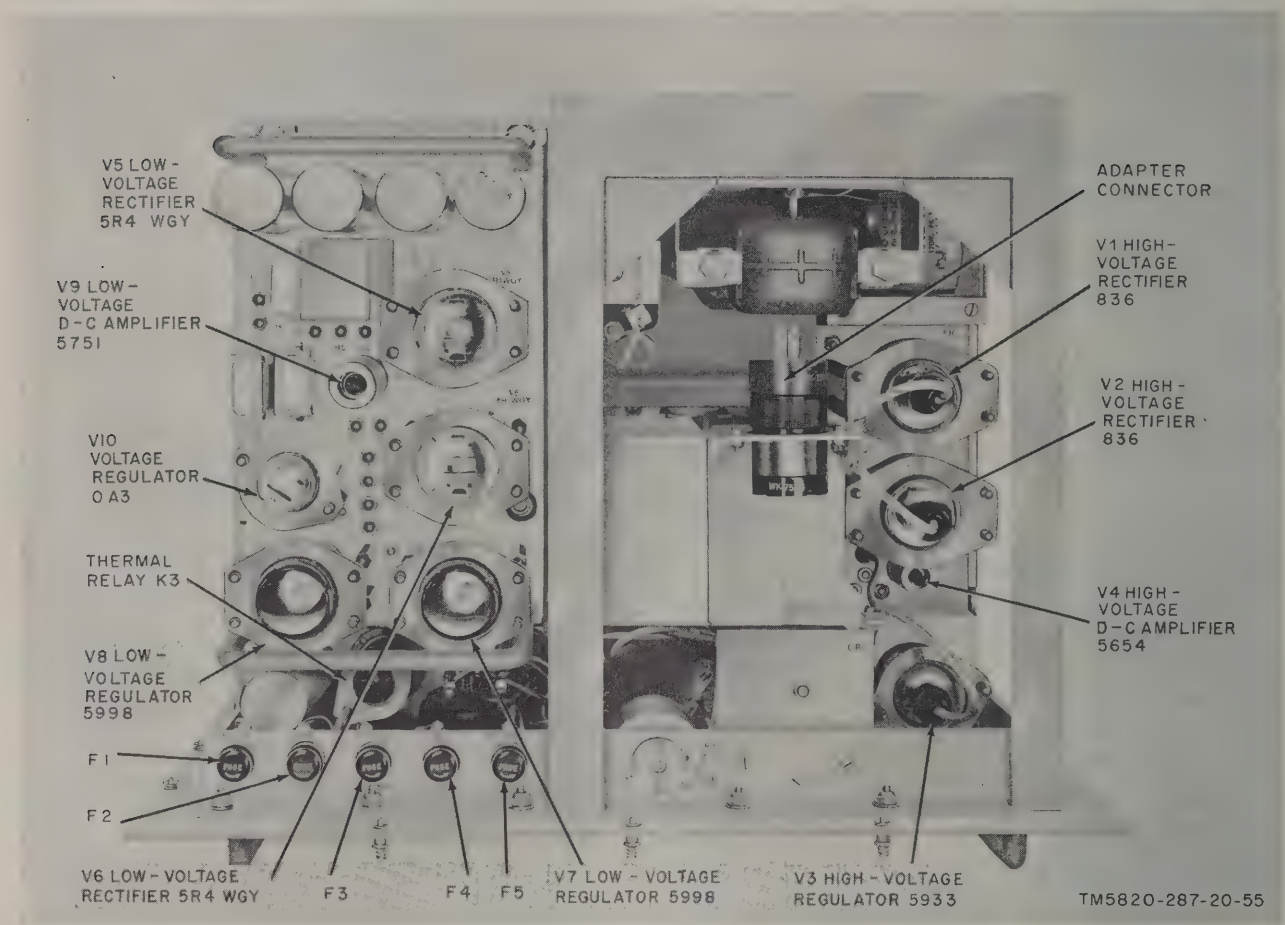


Figure 55. PP–685(*)/TRC, top view, tube locations.

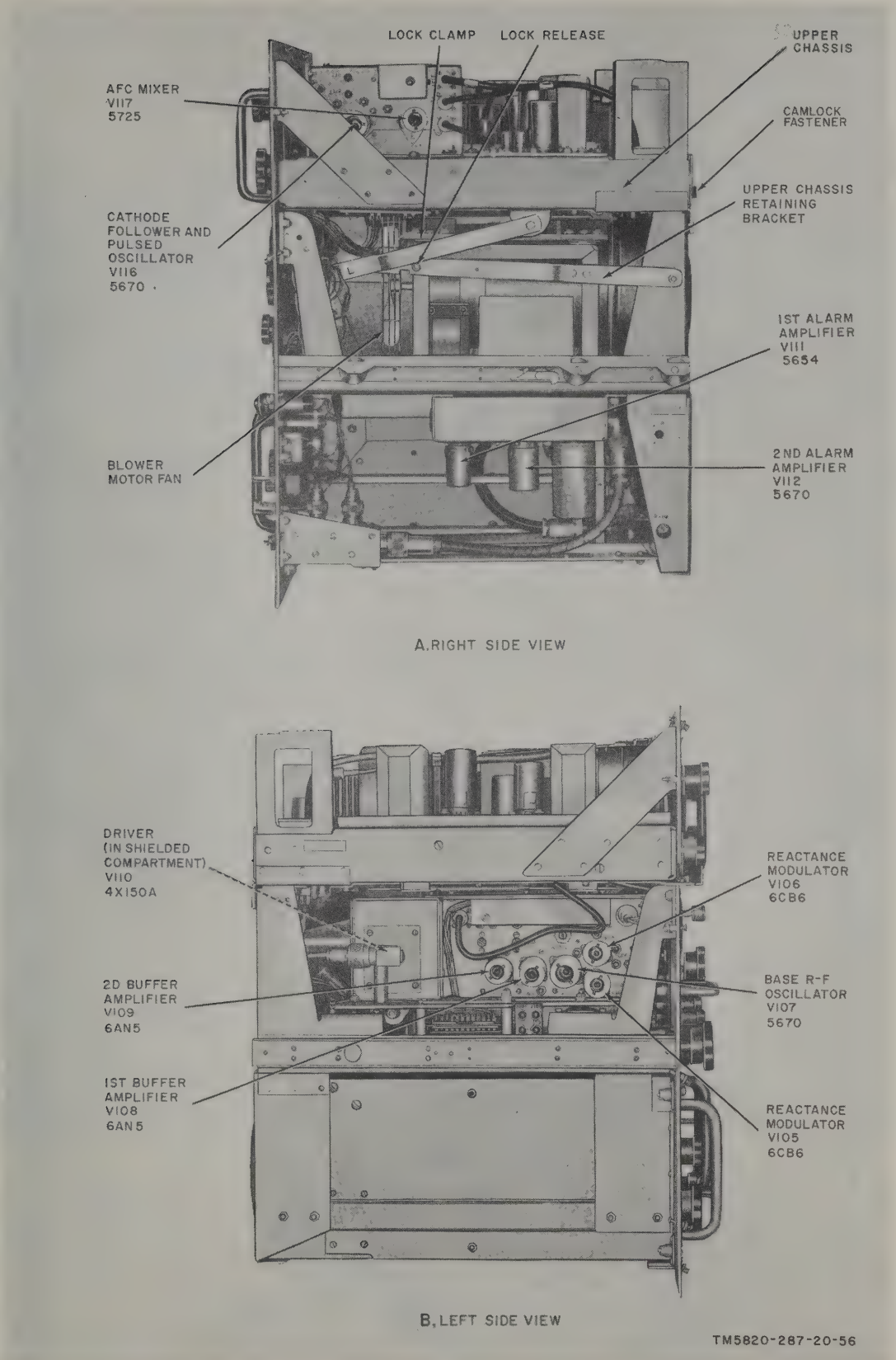


Figure 56. T–302(*)/TRC, side and bottom views, tube locations.

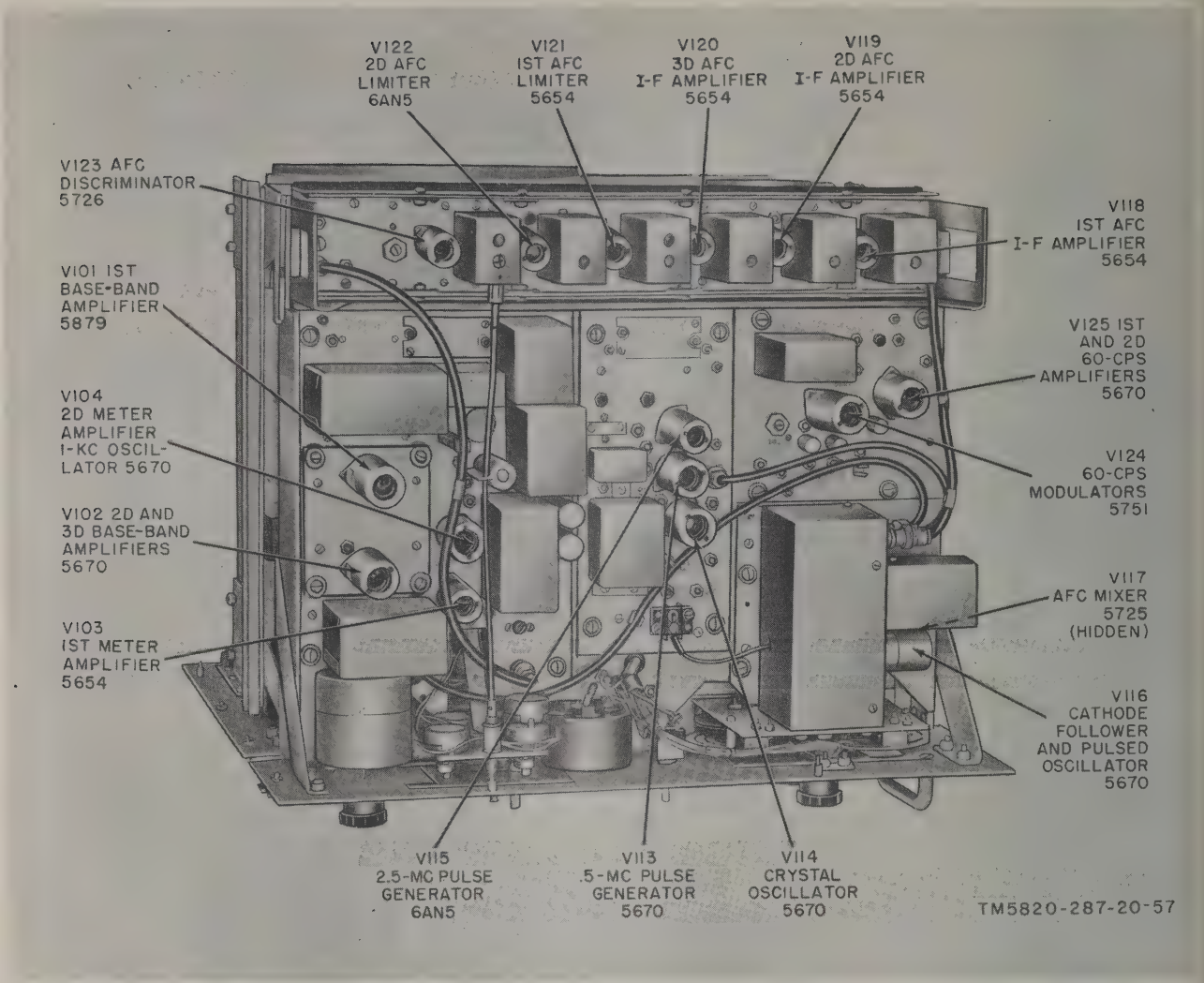


Figure 57. T–302(*)/TRC, top view, tube locations.

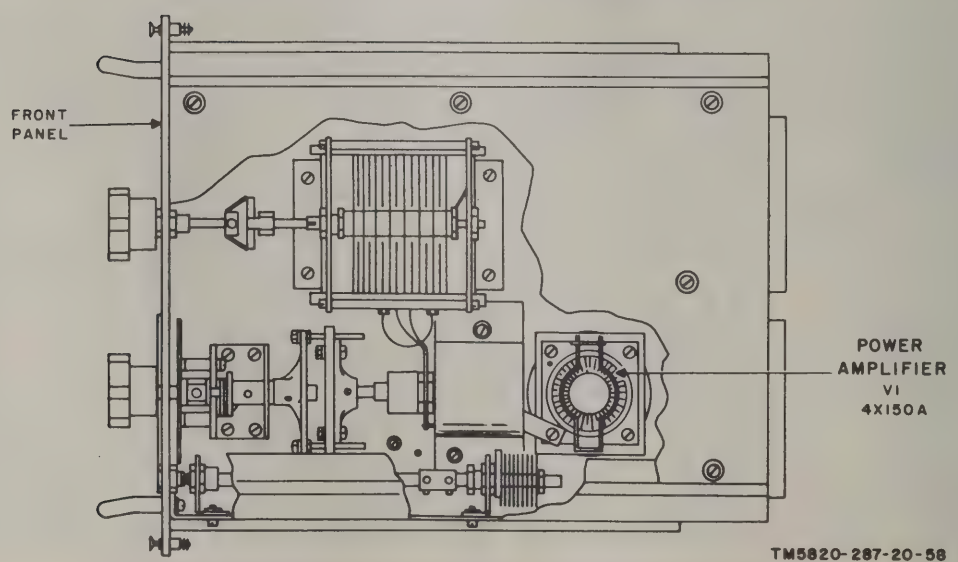


Figure 58. AM–1180/GRC, (A-band), bottom view, tube locations.

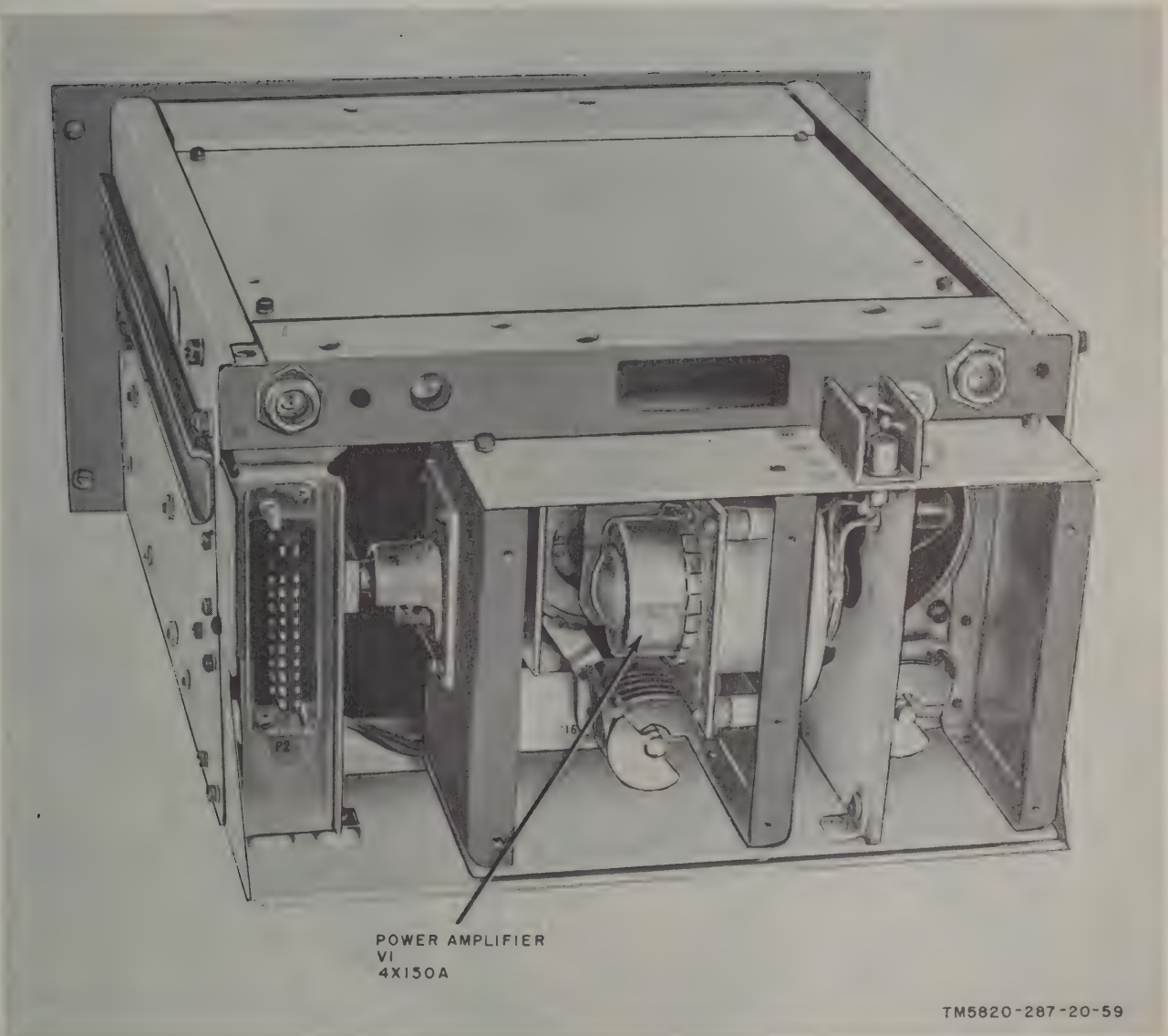


Figure 59. AM–912(*)/TRC (B-band), rear view, tube locations.

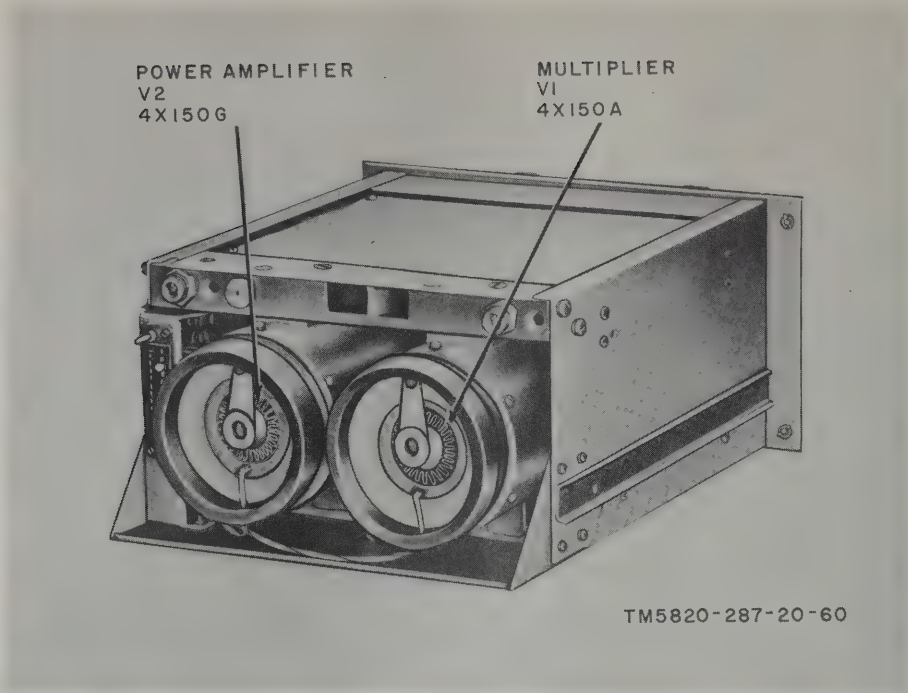


Figure 60. AM–915(*)/TRC (C-band), rear view, tube locations.

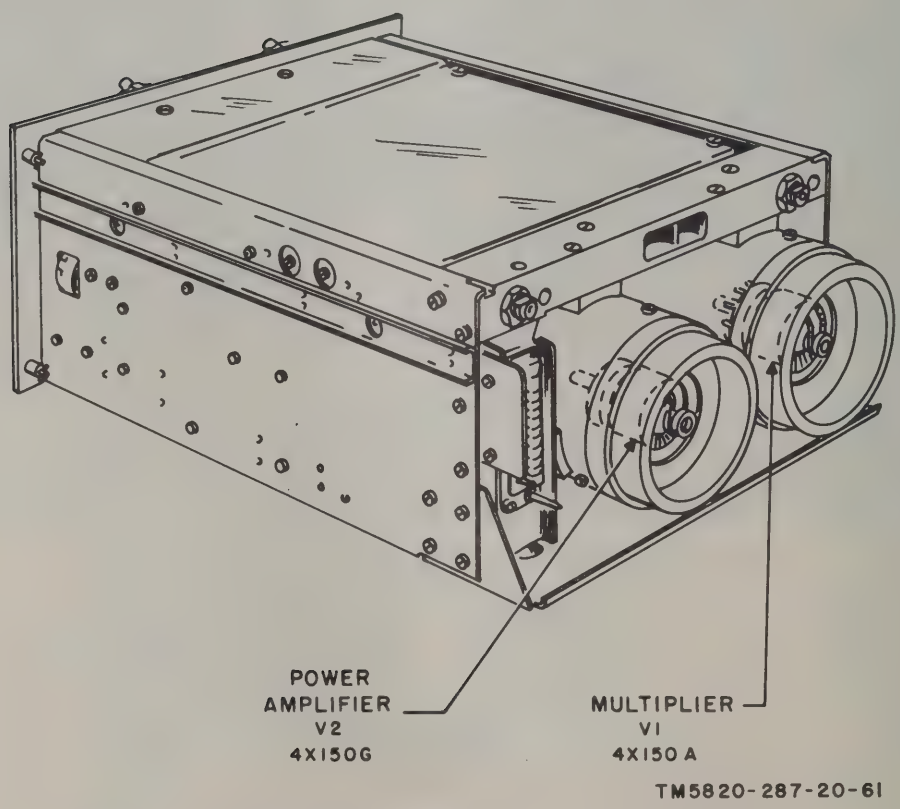


Figure 61. AM–1178/GRC (D-band), rear view, tube locations.

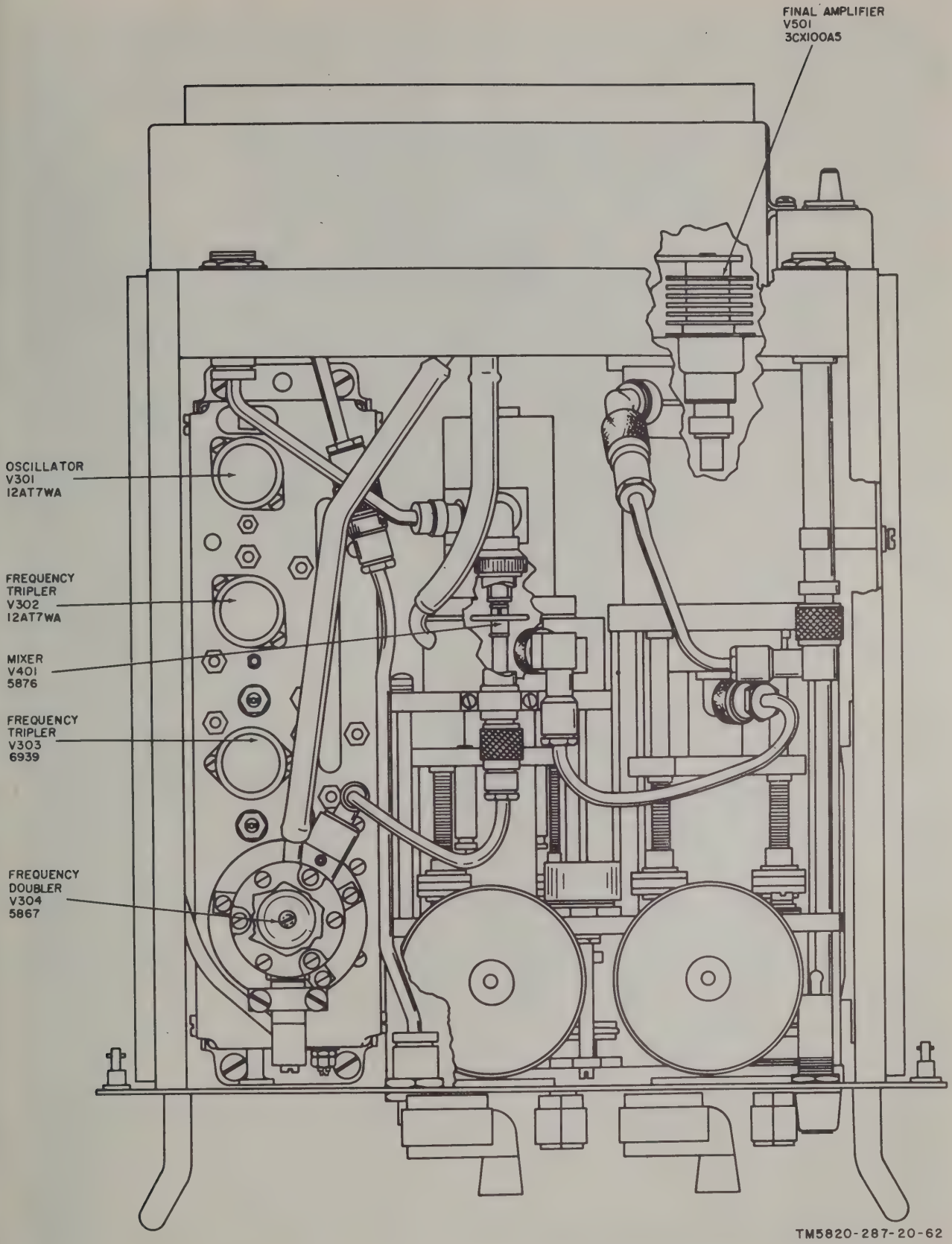


Figure 62. AM–2537/TRA–25 (F-band), top view, tube locations.

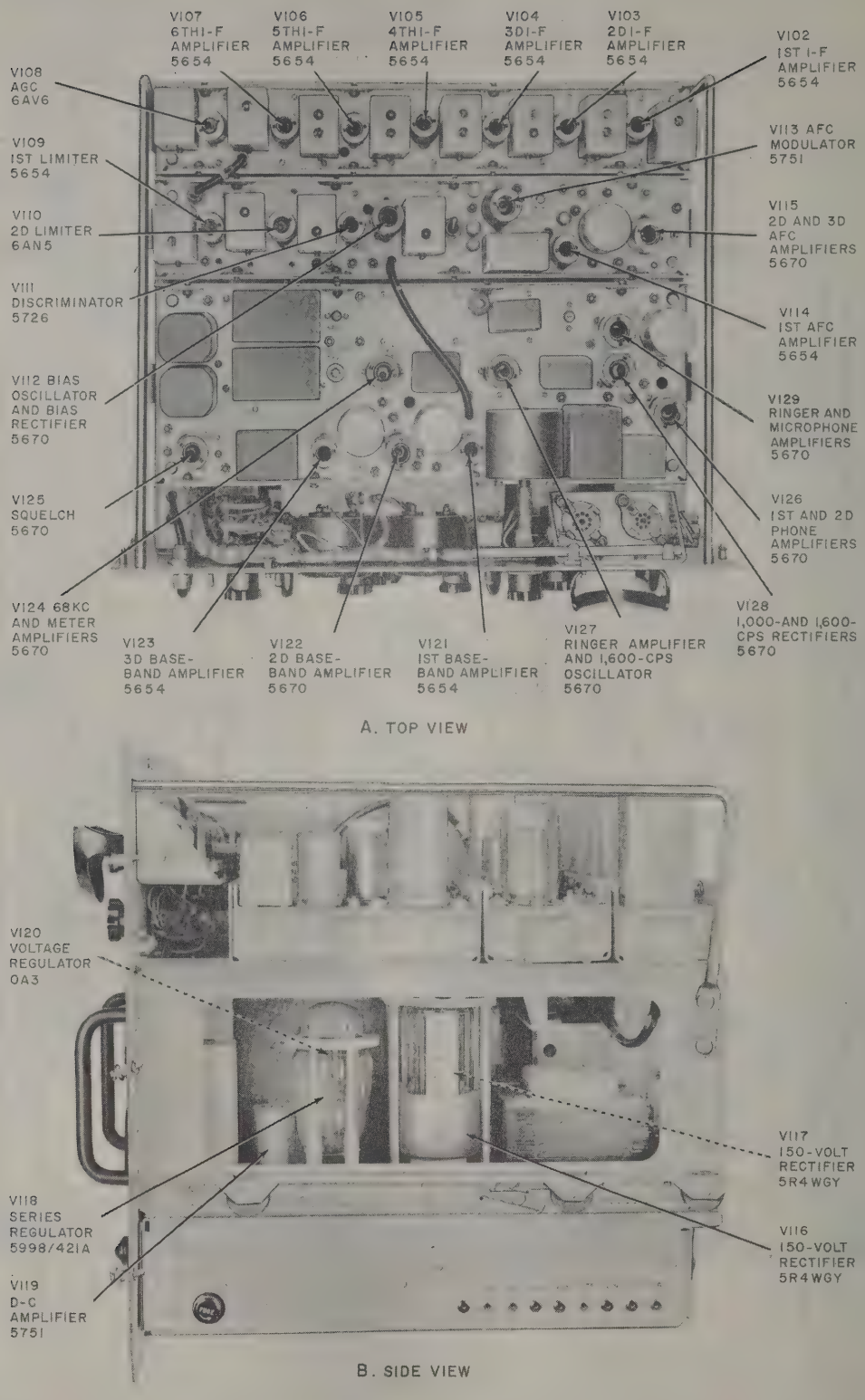


Figure 63. R–417(*)/TRC, top and side views, tube locations.

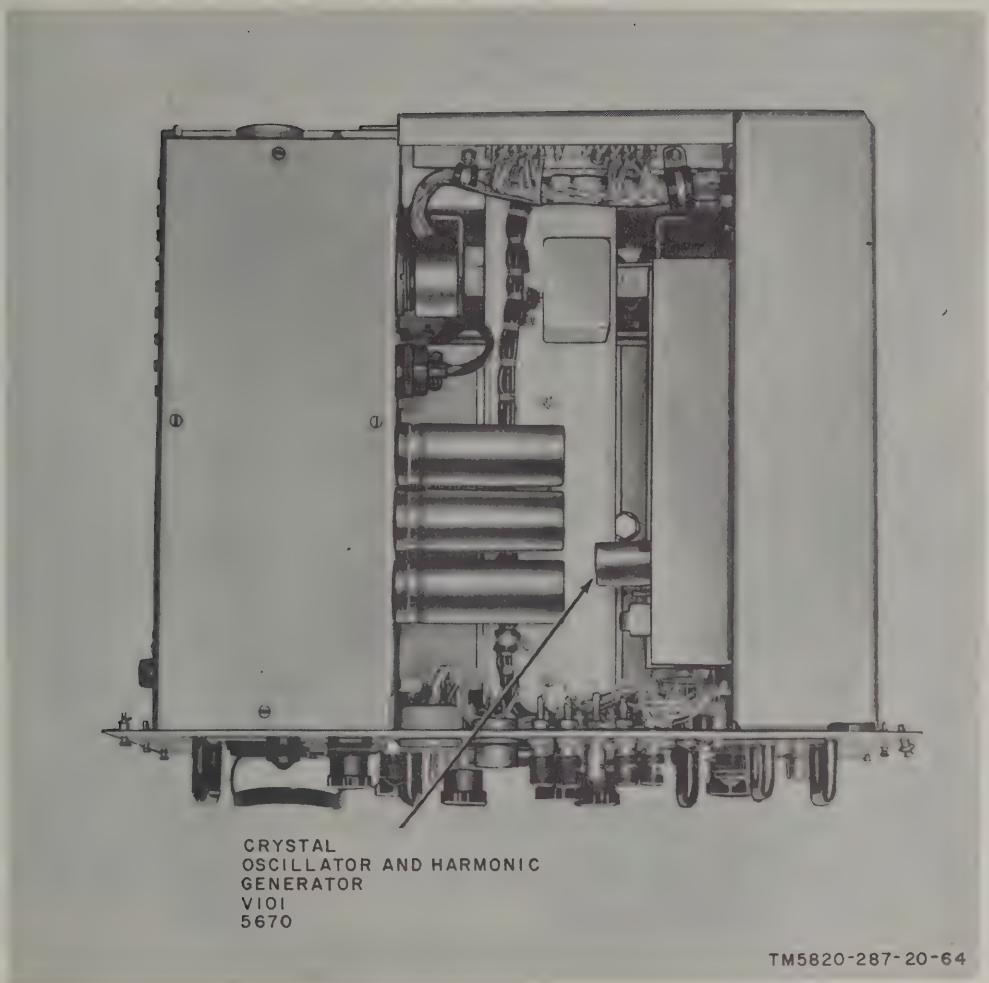


Figure 64. R-417(*)/TRC, bottom view, tube locations.

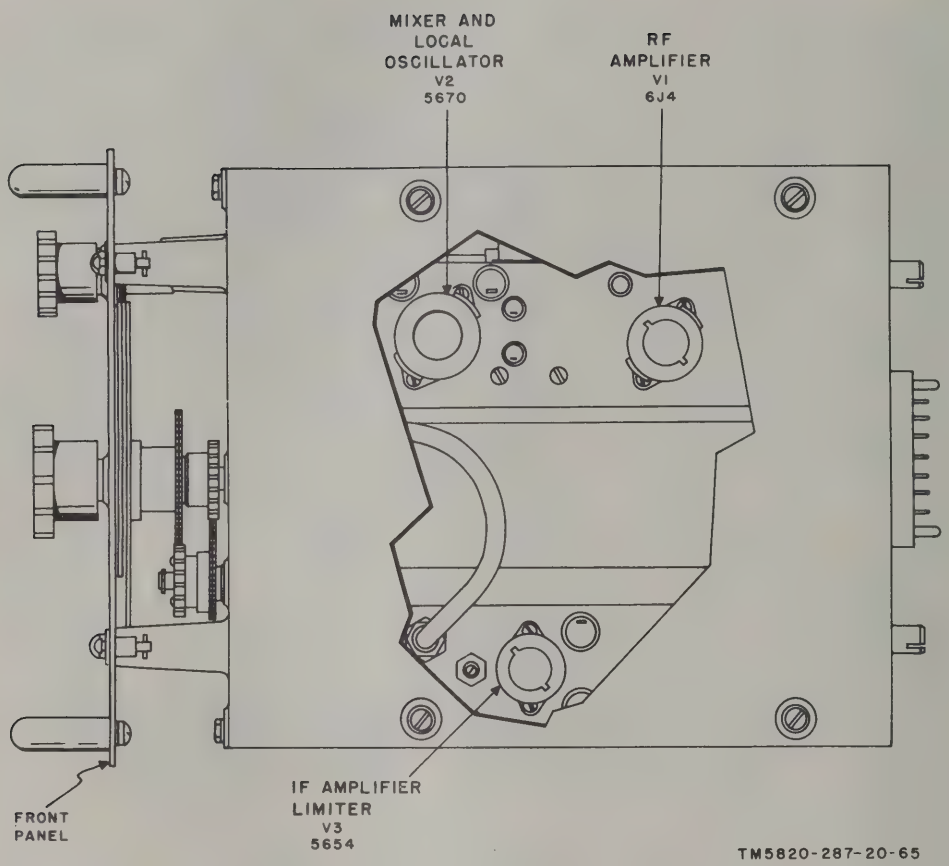


Figure 65. AM–1179/GRC (A-band), bottom view, tube locations.

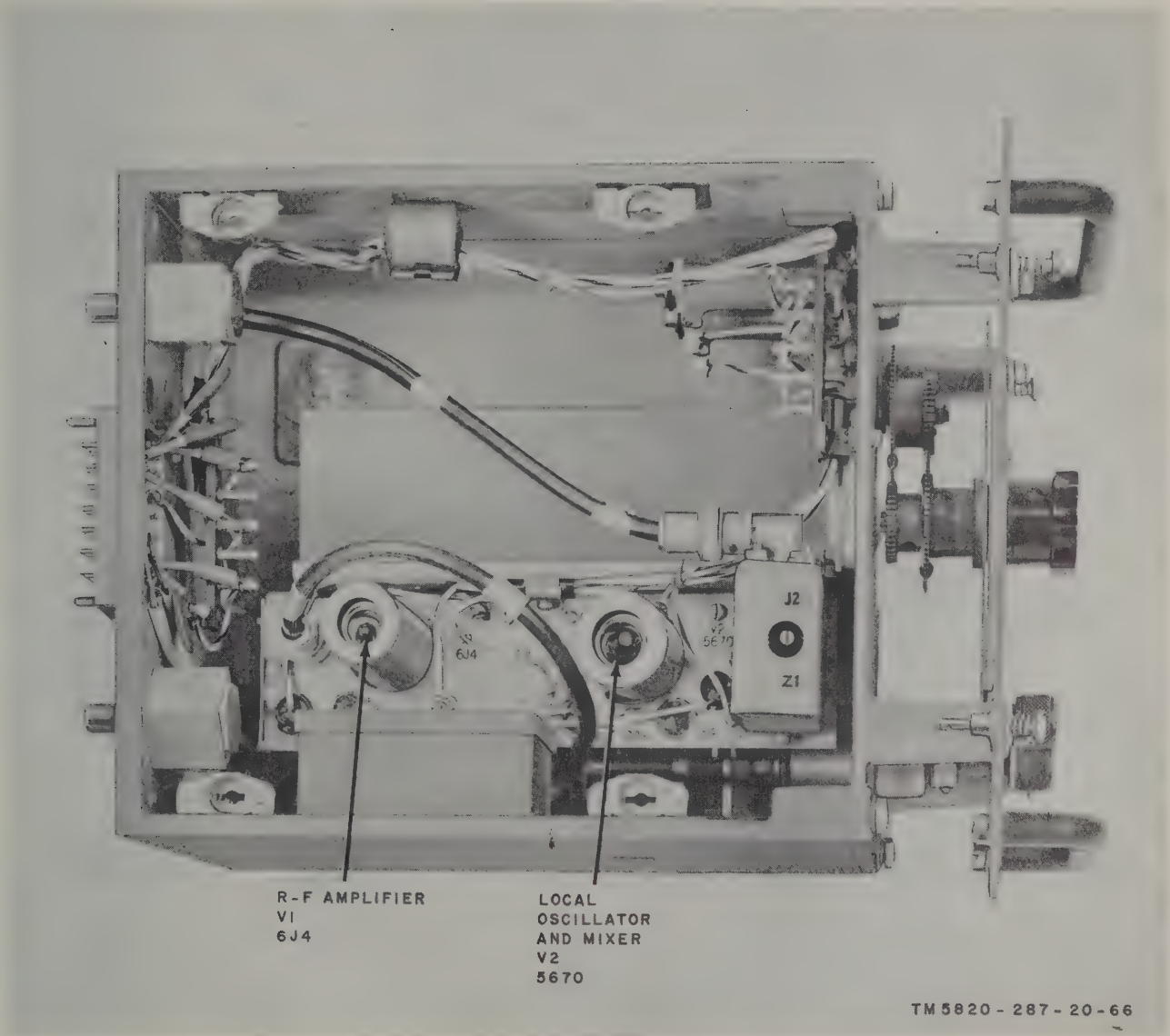


Figure 66. AM–913/TRC (B-band), top view, tube locations.

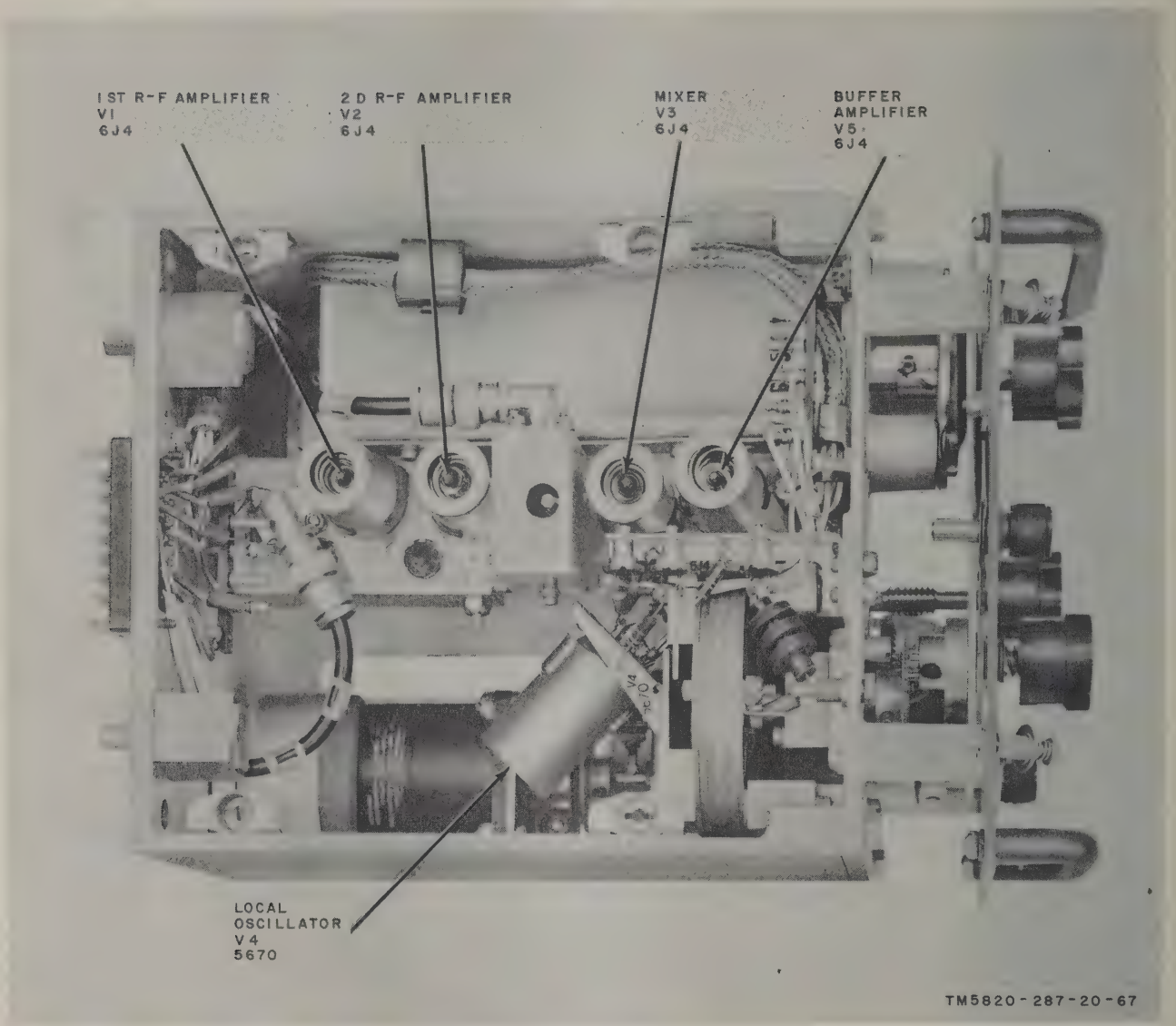


Figure 67. AM–914/TRC (C-band), top view, tube locations.

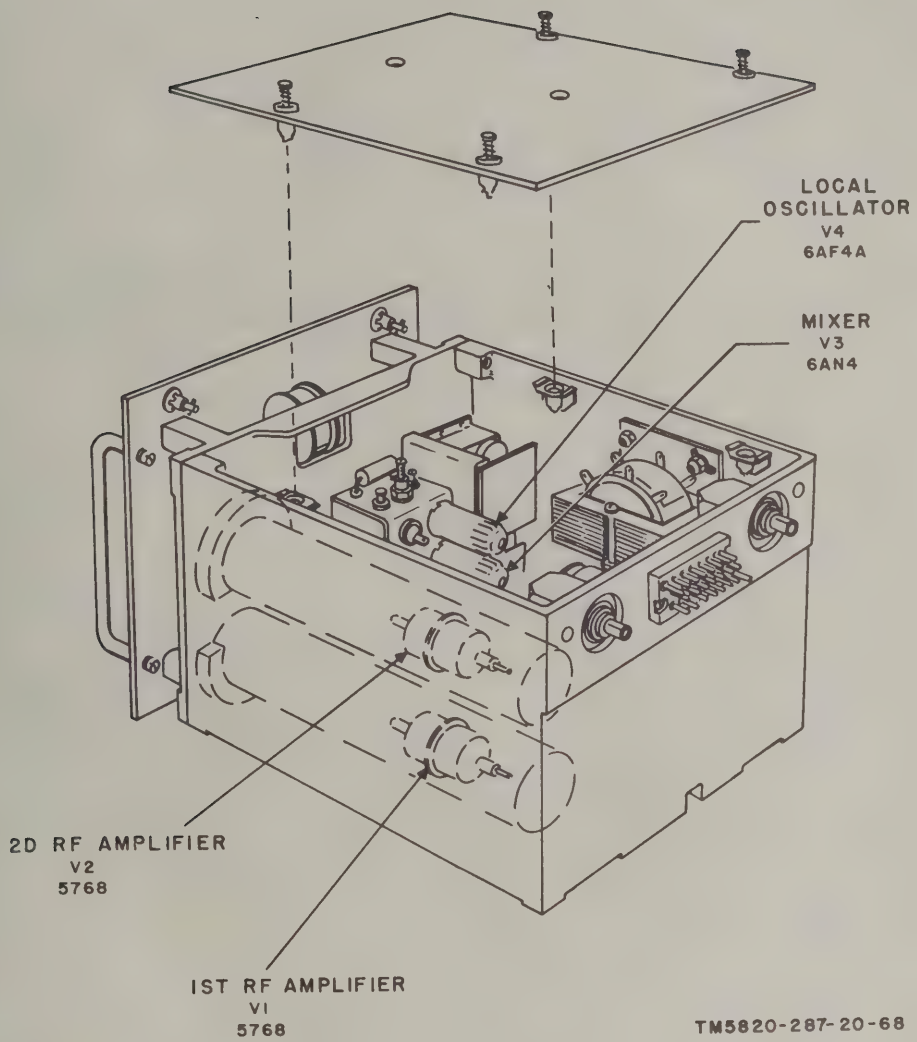


Figure 68. AM–1177/GRC (D-band), tube locations.

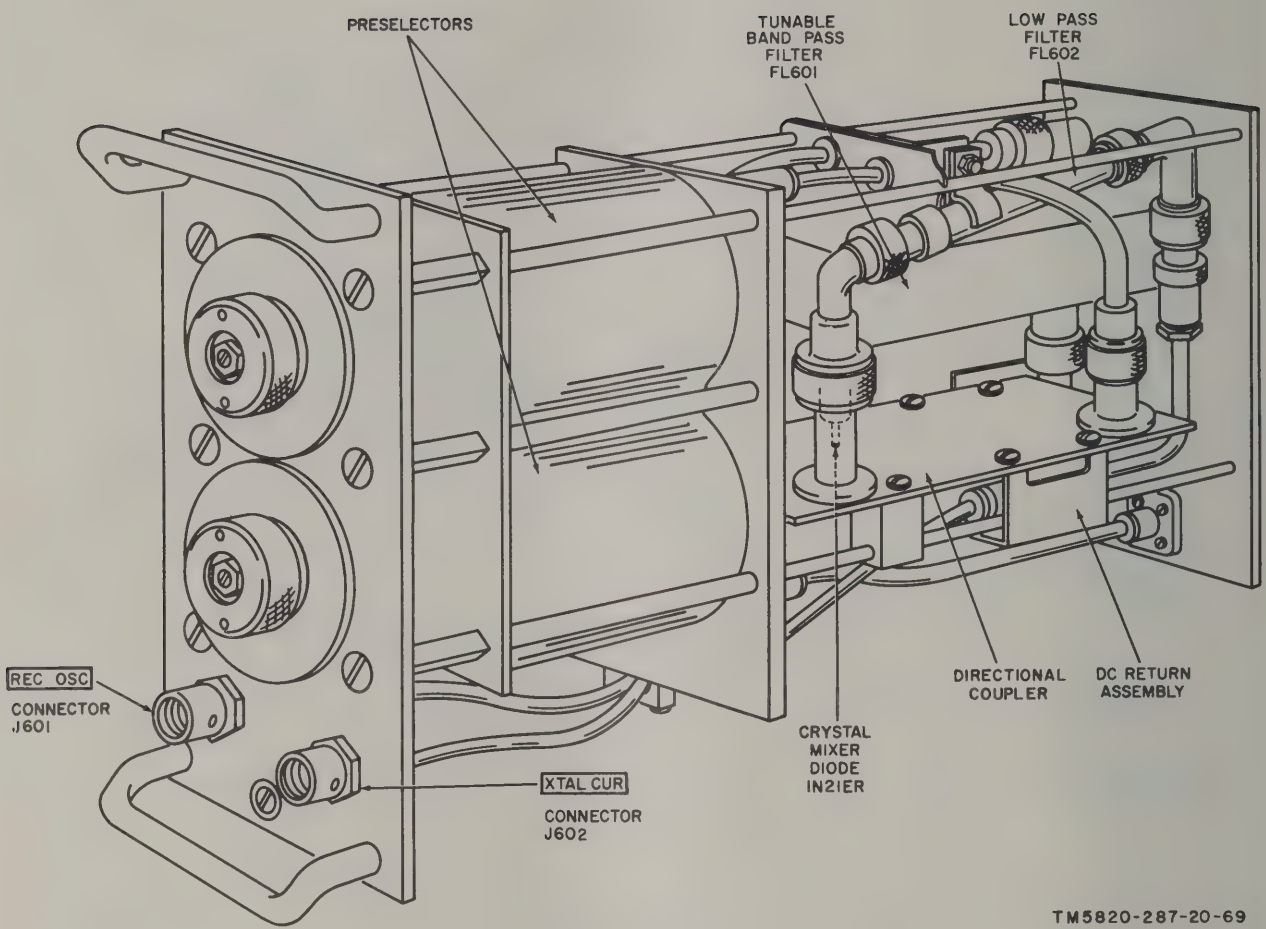


Figure 69. CV–923/TRA–25 (F-band), parts location.

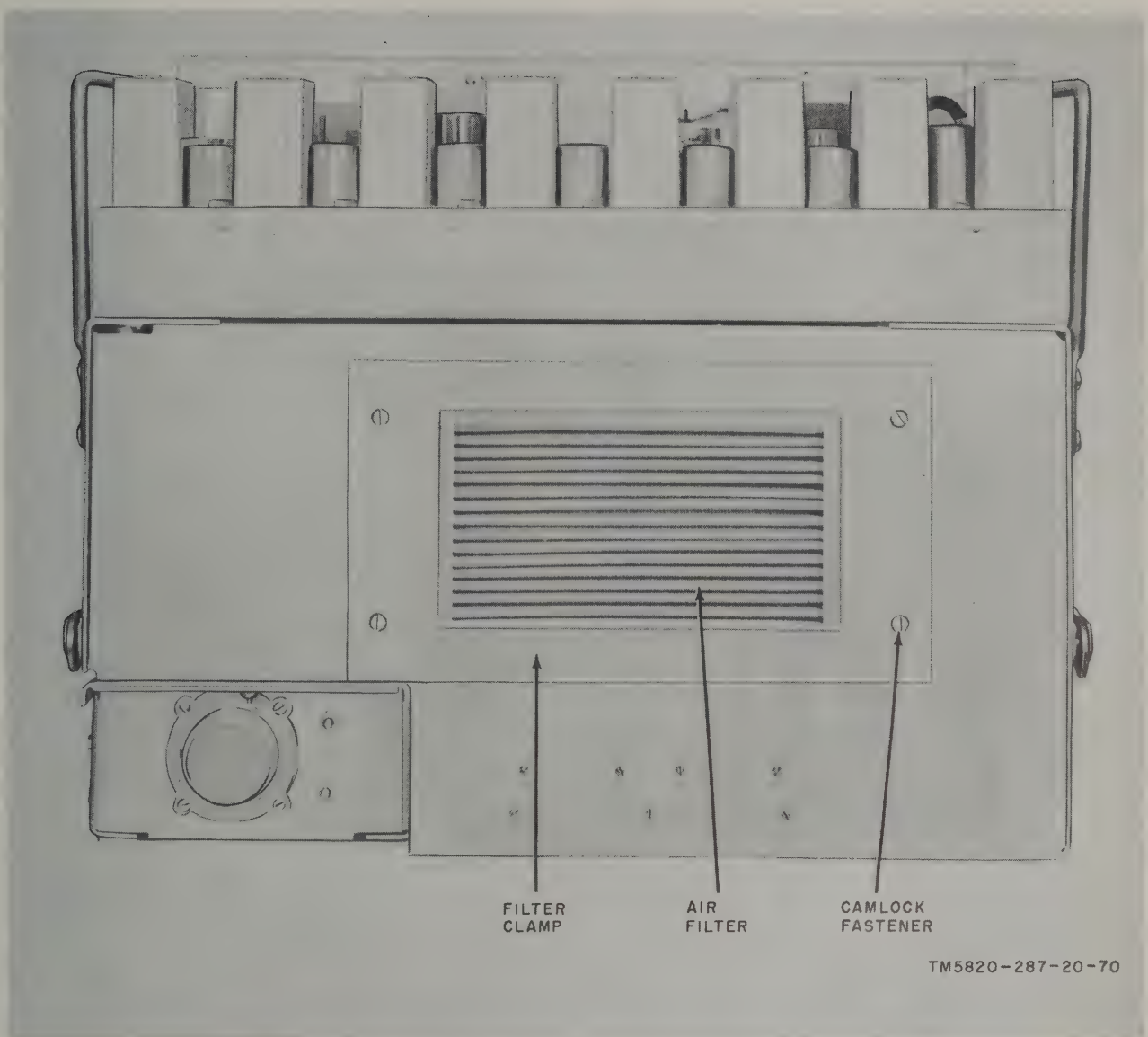


Figure 70. R–417(*)/TRC, rear view, location of air filter.

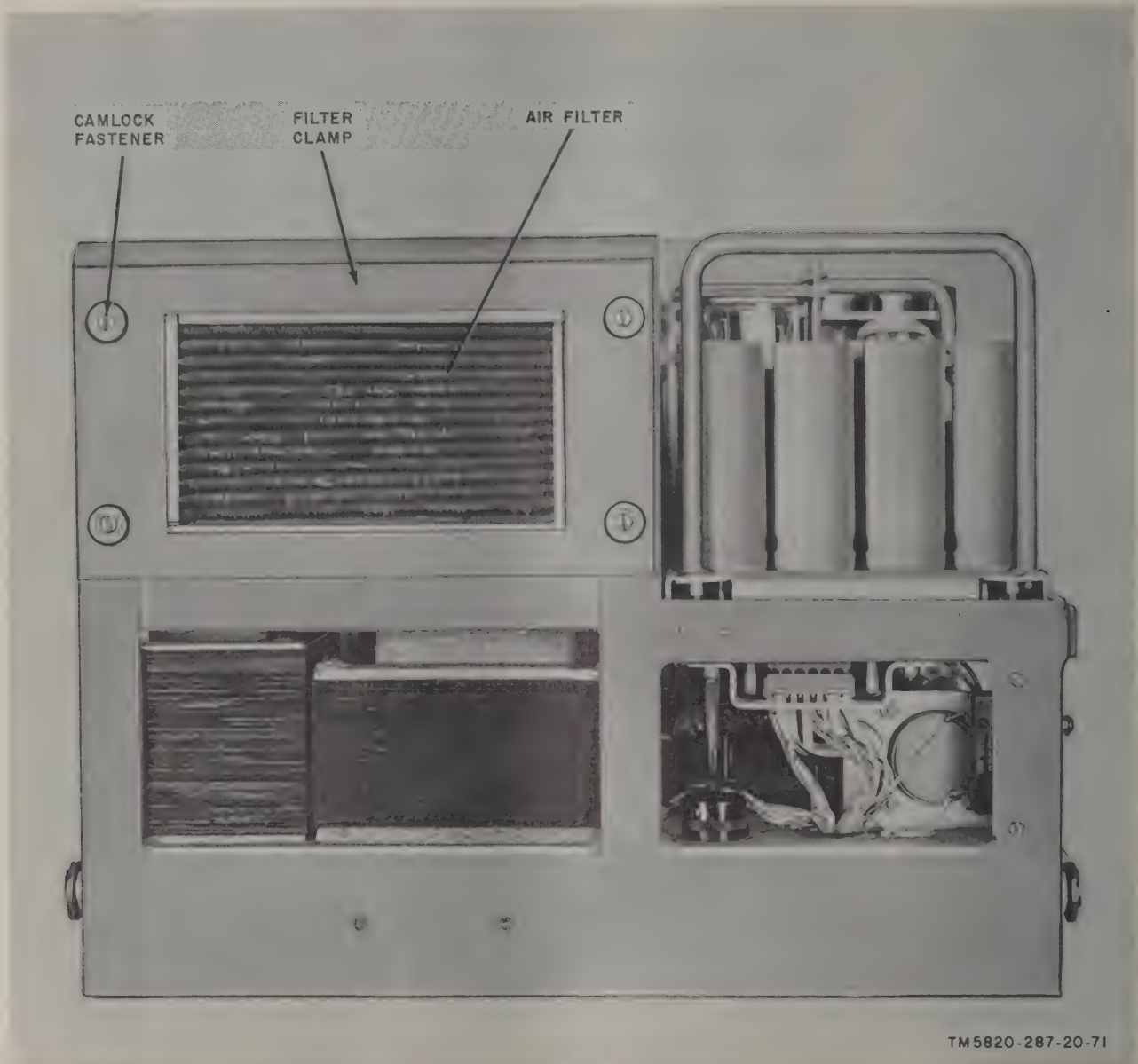


Figure 71. PP–685(*)/TRC, rear view, location of air filter.

(2) Replace the filter clamp and tighten the camlock fasteners.

52. Replacement of Air Filter (T–302(*)/TRC) (fig. 72)

a. Removal.

(1) Remove the transmitter from the carrying case.
(2) Loosen the retaining screws on the rear filter clamp.
(3) Remove the retaining screws on the front filter clamp and remove the front filter clamp.
(4) Remove the air filter.

b. Cleaning.

(1) Wash the air filter in cleaning compound.
(2) Allow the air filter to drain.
(3) Mix a bath of cleaning compound with a few drops of Lubricating Oil, Compounded SAE–30.
(4) Place the air filter in the bath to coat the air filter with a thin film of oil.
(5) Remove and drain the air filter and allow to dry thoroughly.

c. Replacement.

(1) Replace the air filter with the arrow pointing toward the bottom of the carrying case (in the direction of airflow).
(2) Position the front retaining clamp and secure it in place with the retaining screws.
(3) Tighten the screws on the rear retaining clamp.

53. Replacement of Blower Motor Fan Blade (R–417(*)/TRC) (fig. 73)

a. Removal.

(1) Remove the air filter (para 51*a*).
(2) Loosen the Allen screws that secure

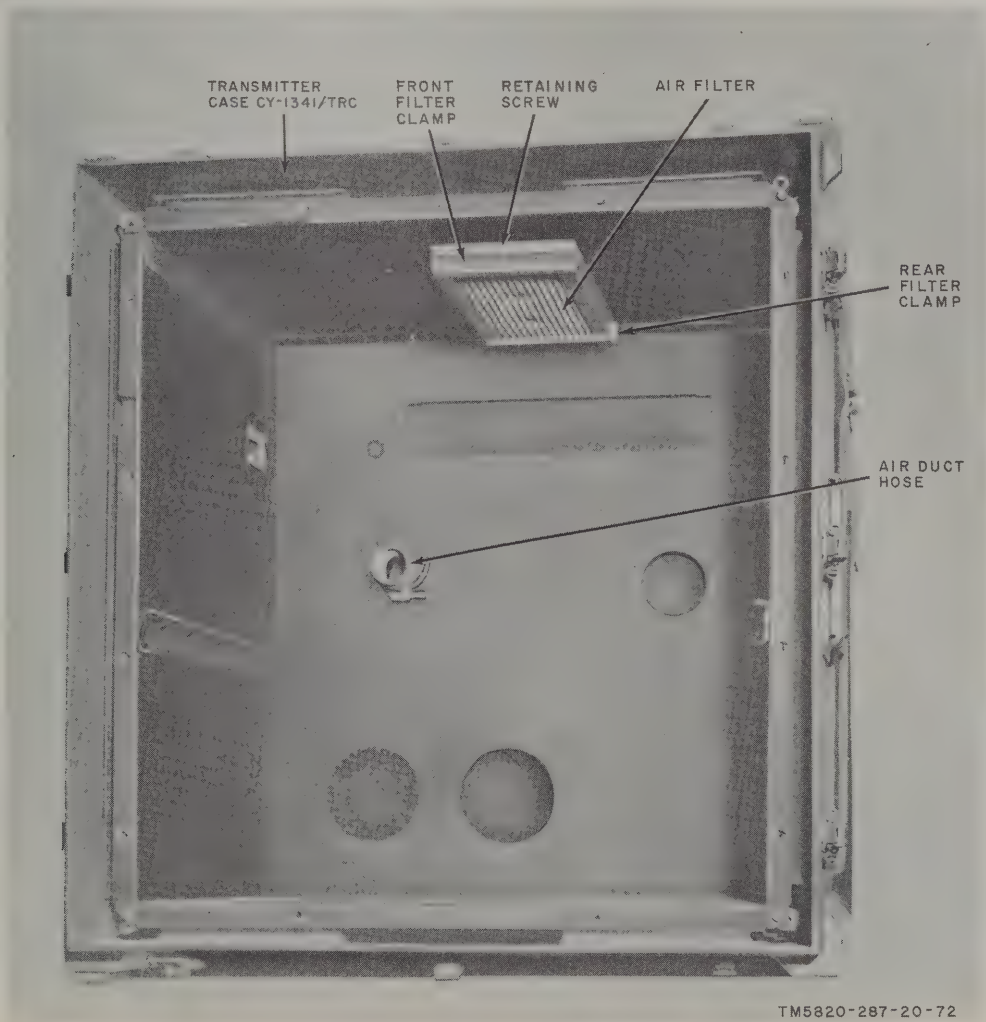


Figure 72. T–302(*)/TRC carrying case, top inside view, location of air filter.

the fan blade to the blower motor shaft.

b. Replacement.

(1) Position the fan blade on the blower motor shaft and tighten the Allen screws.

(2) Replace the air filter (para 51*c*).

54. Replacement of Blower Motor Fan Blade (T–302(*)/TRC)

a. Removal.

(1) Release the camlock fasteners (A, fig. 56) at the rear of the pulse oscillator assembly.

(2) Pull the vibration mount (A, fig. 41) forward to unlock the pulse oscillator assembly.

(3) Lift the upper chassis (A, fig. 56) as far as it will go to lock it in place.

(4) Push the lock clamp down over the upper chassis retaining bracket to secure it.

(5) Loosen the Allen screws that secure the blower motor fan blade to the blower motor shaft.

(6) Remove the blower motor fan blade.

b. Replacement.

(1) Replace the blower motor fan blade on the blower motor shaft.

(2) Tighten the Allen screws to secure the blower motor fan blade to the blower motor shaft.

(3) Release the lock clamp and depress the lock release.

(4) Lower the upper chassis with the vibration mount (A, fig. 41) pulled forward.

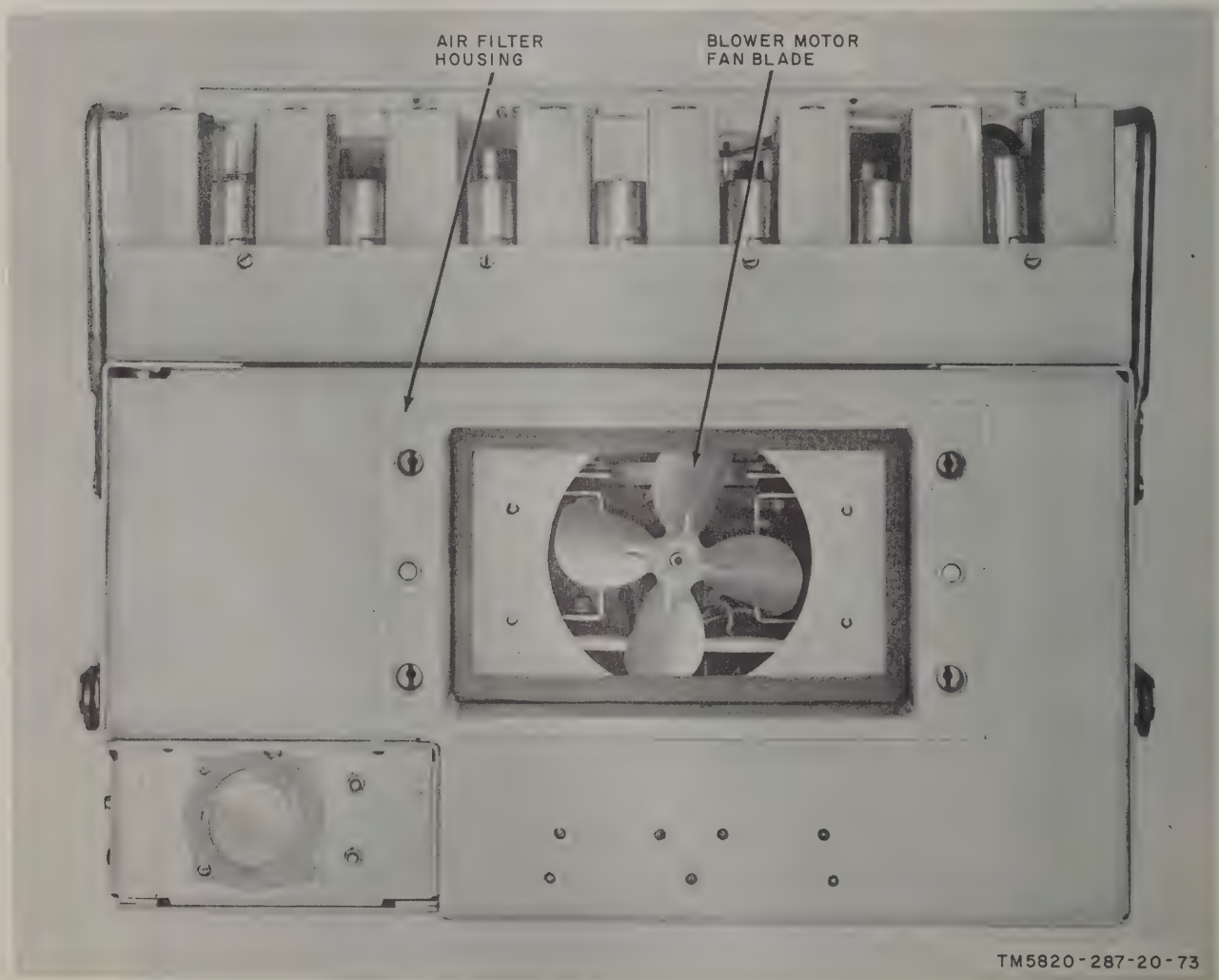


Figure 73. R–417(*)/TRC, rear view, location of fan blade.

(5) Push in the vibration mount to secure the upper chassis.
(6) Tighten the camlock fasteners (A, fig. 56) at the rear of the pulse oscillator assembly.

55. Replacement of Bandpass Filter Control

a. A-band (A, fig. 74).

(1) *Removal.*

(*a*) Turn the knob assembly (10) completely counterclockwise to the stop limit.
(*b*) Remove the retaining nut (1).
(*c*) Remove the knob assembly (10) from the threaded shaft (3) by turning the knob assembly counterclockwise.
(*d*) Loosen the bristol screws (6) on the retaining ring (7) and remove the retaining ring (7) and the dial (5) from the knob (2).
(*e*) Remove the screws (4) and remove the dial (5) from the retaining ring (7).

(2) *Replacement.*

(*a*) Fasten the dial (5) on the retaining ring (7) with the screws (4).
(*b*) Center the alignment hole (11) on the guide pin (9) to assure correct dial calibration.
(*c*) Fasten the retaining ring (7) and the dial (5) on the knob (2) with the bristol screws (6).
(*d*) Turn the threaded shaft (3) completely clockwise.
(*e*) Turn the knob assembly (10) clockwise on the threaded shaft (3) with the guide pin (9) in the guide slot (8).
(*f*) Turn the retaining nut (1) clockwise on the threaded shaft (3).

Caution: **Do not overtighten the retaining nut. Overtightening of the retaining nut will cause incorrect dial calibration.**

b. B-, C-, or D-band (B, fig. 74).

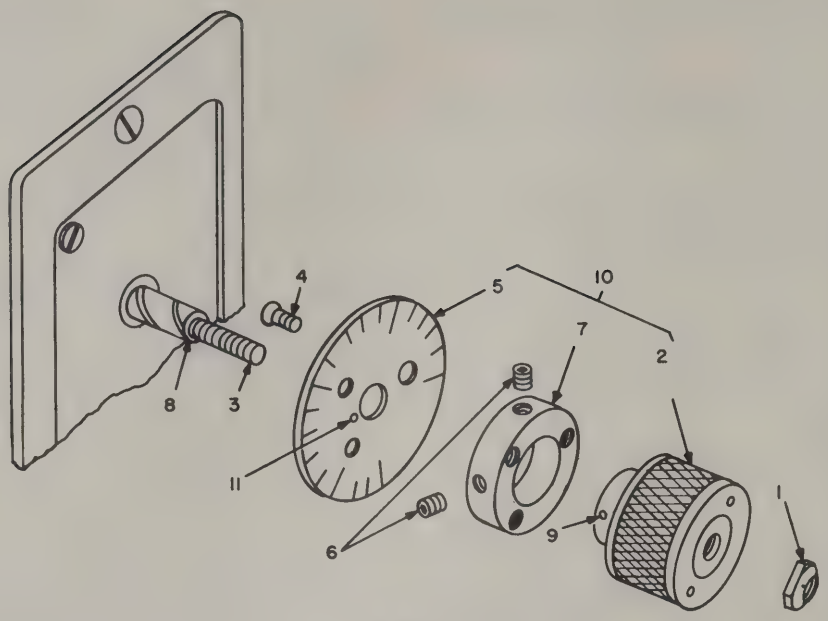
(1) *Removal.*

(*a*) Turn the knob assembly (10) completely counterclockwise.
(*b*) Remove the retaining nut (1).
(*c*) Remove the knob assembly (10) from the threaded shaft (3) by turning the knob assembly counterclockwise.
(*d*) Remove the screws (4) to remove the dial (5) from the knob (2).

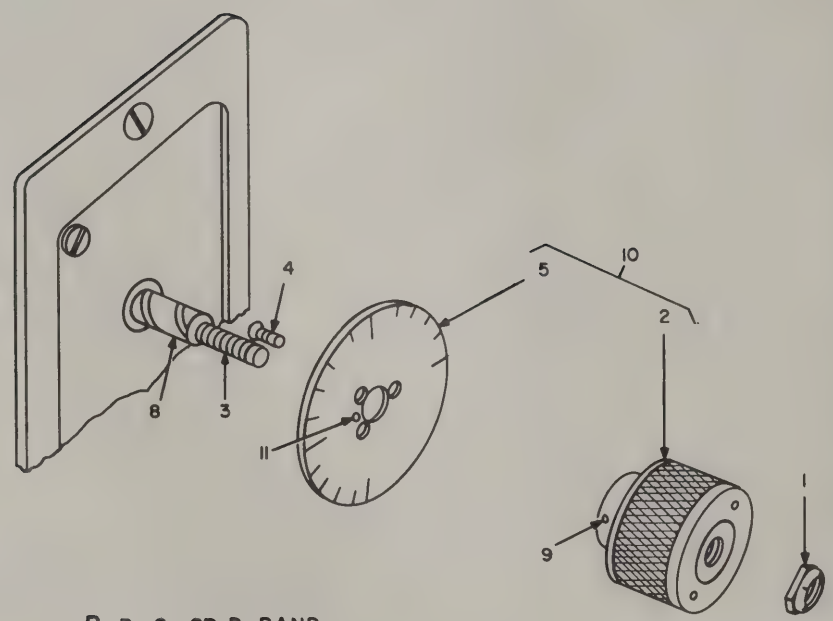
(2) *Replacement.*

(*a*) Place the dial (5) on the knob (2) with the alignment hole (11) next to the guide pin (9).
(*b*) Fasten the dial (5) to the knob (2) with the screws (4).
(*c*) Turn the threaded shaft (3) completely clockwise.
(*d*) Turn the knob assembly (10) clockwise on the threaded shaft (3) with the guide pin (9) in the guide slot (8).
(*e*) Turn the retaining nut (1) clockwise on the threaded shaft (3).

Caution: **Do not overtighten the retaining nut. Overtightening of the retaining nut will cause incorrect dial calibration.**



A. A BAND

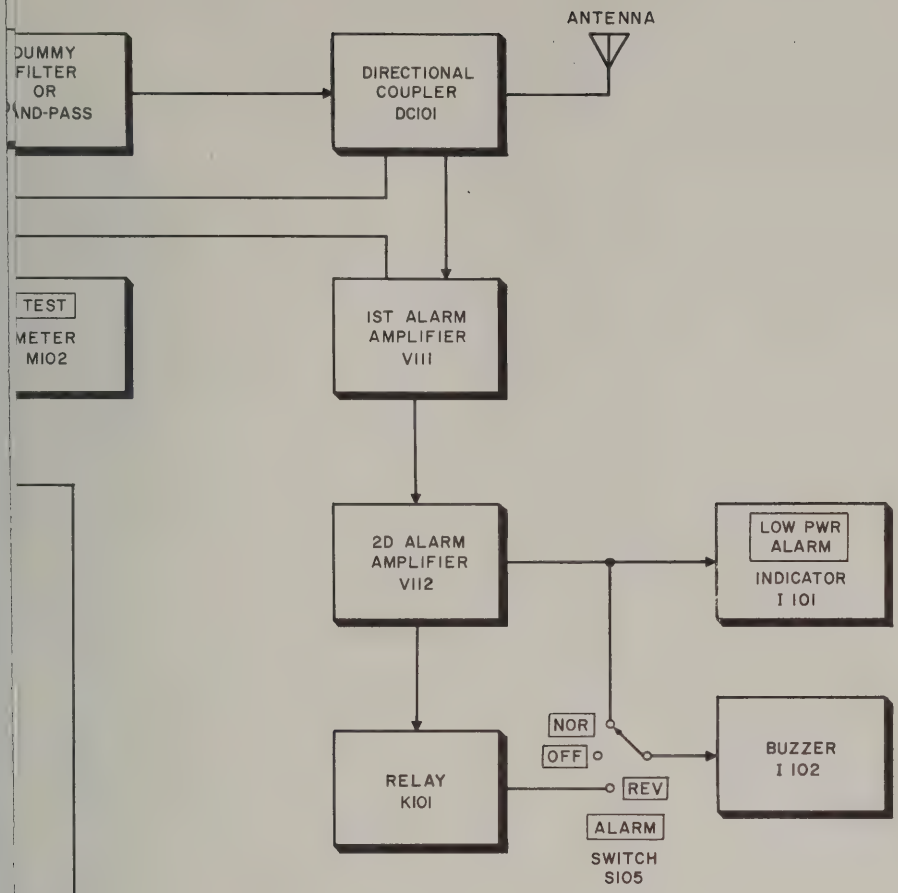


B .B-,C-, OR D-BAND

TM5820-287-20-74

1 Retaining nut
2 Knob
3 Threaded shaft
4 Screw
5 Dial
6 Bristol screw
7 Retaining ring
8 Guide slot
9 Guide pin
10 Knob assembly
11 Alignment hole

Figure 74. Bandpass filter, exploded view of control.

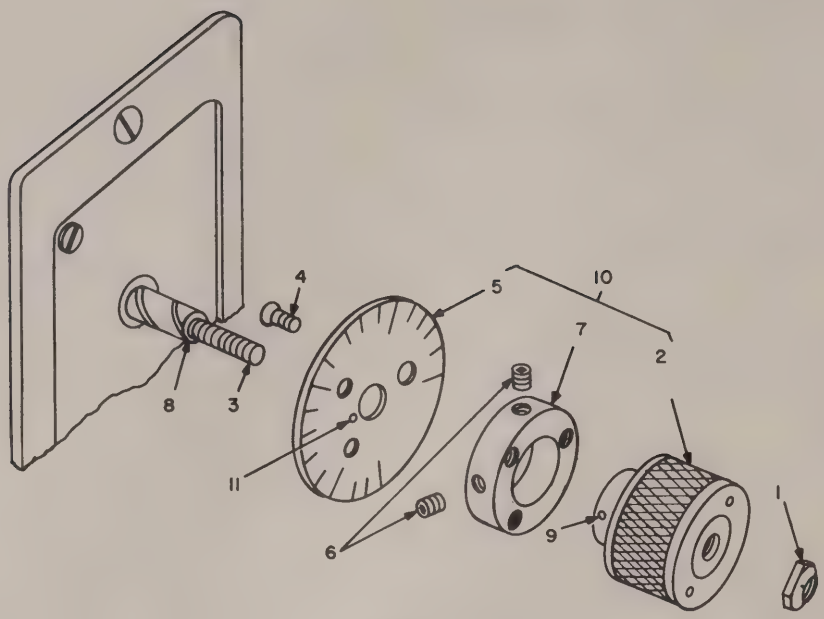


NOTES:

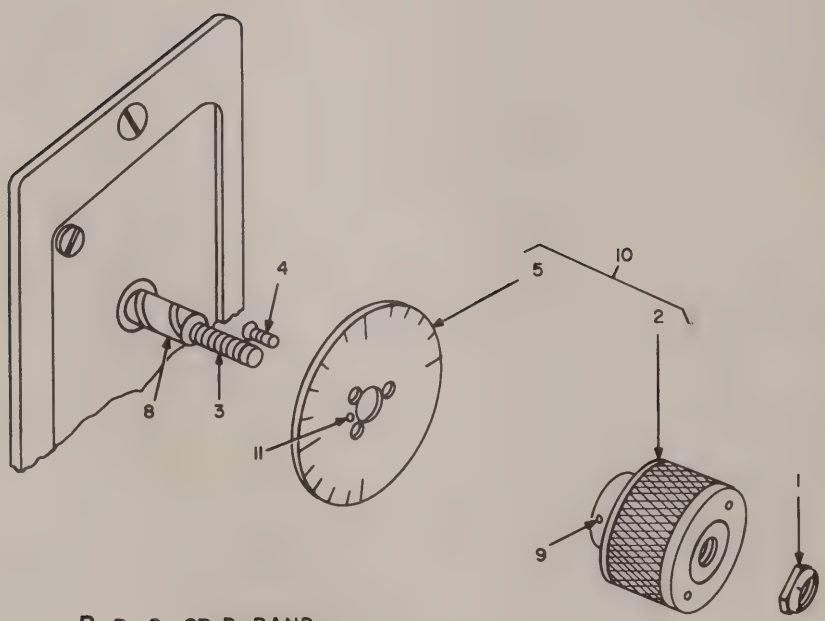
1. ▭ INDICATES EQUIPMENT MARKINGS.
2. MEASURE SWITCH S102 IS SHOWN IN RF CHAN TUNE POSITION. SWITCH POSITION PANEL MARKINGS WITH RESPECT TO CONTACT NUMBERS ARE AS FOLLOWS:

SWITCH POSITION PANEL MARKING	CONTACT NO.
RF CHAN TUNE	1
1 KC ADJ	2
MTR CAL	3
DISCR RF DRIVE	4
1 KC IN	5
68 KC IN	6
MOD 1 KC IN	7
MOD 68 KC IN	8
MOD ADJ	9

3. ---- INDICATES MECHANICAL LINKAGE.
4. REFER TO TRANSMITTER TUNING HEAD BLOCK DIAGRAM.



A. A BAND



B .B-,C-, OR D-BAND

TM5820-287-20-74

1 Retaining nut
2 Knob
3 Threaded shaft
4 Screw
5 Dial
6 Bristol screw
7 Retaining ring
8 Guide slot
9 Guide pin
10 Knob assembly
11 Alignment hole

Figure 74. Bandpass filter, exploded view of control.

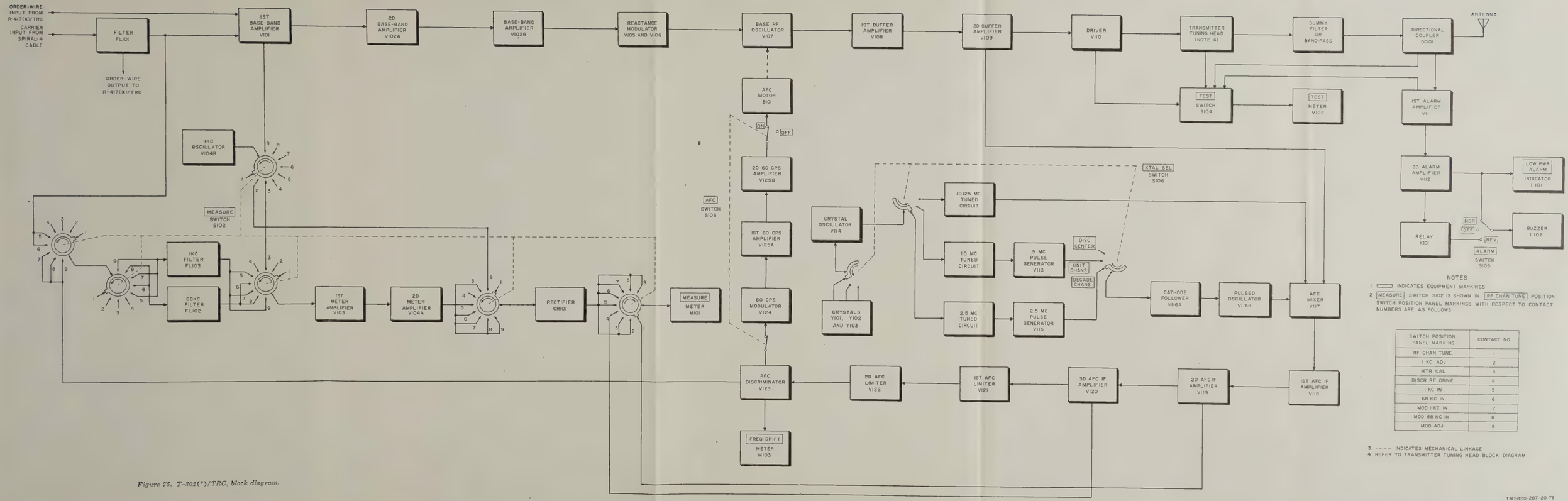


Figure 75. T–802(*)/TRC, block diagram.

NOTES

1 ▭ INDICATES EQUIPMENT MARKINGS

2 MEASURE SWITCH S102 IS SHOWN IN RF CHAN TUNE POSITION SWITCH POSITION PANEL MARKINGS WITH RESPECT TO CONTACT NUMBERS ARE AS FOLLOWS

SWITCH POSITION PANEL MARKING	CONTACT NO
RF CHAN TUNE	1
I KC ADJ	2
MTR CAL	3
DISCR RF DRIVE	4
I KC IN	5
68 KC IN	6
MOD I KC IN	7
MOD 68 KC IN	8
MOD ADJ	9

3 - - - - INDICATES MECHANICAL LINKAGE

4 REFER TO TRANSMITTER TUNING HEAD BLOCK DIAGRAM

TM5820-287-20-76

CHAPTER 6

BLOCK DIAGRAM THEORY

56. T–302(*)/TRC

a. General. The transmission circuits (*b* below) of the T–302(*)/TRC frequency modulate carrier signals and order-wire signals on a very high frequency (vhf) carrier for transmission between the radio links of a carrier system. The automatic frequency control (afc) circuits (*c* below) maintain a stable vhf carrier frequency and provide accurate tuning of the vhf carrier frequency. The measuring circuits (*d* below) provide accurate calibration of the transmission circuits and monitoring of the carrier signals before and after modulation. The test circuits (*e* below) provide facilities for accurately tuning the amplifier stages and determining the output and reflected power. The alarm circuits (*f* below) provide visual and aural indications of low or no output power.

b. Transmission Circuits. The carrier signals are applied through filter FL101 (fig. 75) to first base-band amplifier V101. The order-wire signals at the output of filter FL101 are applied to the R–417(*)/TRC (para 58*h*(1)). In addition to the carrier signals, order-wire signals from the R–417(*)/TRC (para 59*h*-(2)) are also applied to first base-band amplifier V101. The carrier and order-wire signals from first base-band amplifier V101 are amplified by second and third base-band ampliers V102A and V102B and applied to reactance modulator V105 and V106. Reactance modulator V105 and V106 frequency modulate the carrier and order-wire signals on the vhf carrier frequency generated by base rf oscillator V107. The vhf carrier is applied through first and second buffer amplifiers V108 and V109 to driver V110. Driver V110 amplifies the signal frequency for A-band operation, and doubles the signal frequency for B-, C-, D-, and F-band operation. The output of driver V110 is applied to the transmitter tuning head. The transmitter tuning head (fig. 76) amplifies the vhf carrier sufficiently for transmission (A- or B-band), or increases the frequency of the vhf carrier and then amplifies it sufficiently for transmission (C-, D-, or F-band). The vhf carrier from the transmitter tuning head (fig. 75) is applied through the dummy filter or band-pass filter and directional coupler DC101 to the transmitting antenna.

c. Afc Circuits (fig. 75). Crystal oscillator V114 generates one of three frequencies determined by the position of XTAL SEL switch S106. When ZTAL SEL switch S106 is in the DECADE CHANS position, crystal oscillator V114 generates a 2.5-megacycle (mc) frequency. When XTAL SEL switch S106 is in the UNIT CHANS position, crystal oscillator V114 generates a 1-mc frequency. When XTAL SEL switch S106 is in the DISCR CENTER position, crystal oscillator V114 generates a 10.125-mc frequency. The 10.125-mc frequency is used to tune afc discriminator V123 ((1) below). The 2.5-mc frequency is used to tune pulsed oscillator V116B (2) below. The 1-mc frequency is used to tune base rf oscillator V107 and maintain its frequency ((3) below).

(1) When XTAL SEL switch S106 is in the DISCR CENTER position, the 10-.125-mc tuned circuit is connected to crystal oscillator V114 and a 10.125-mc crystal is selected. The 10.125-mc output is applied to afc mixer V117. The signal is then applied through first, second, and third afc intermediate frequency (if.) amplifiers V118, V119, and V120 to first afc limiter V121. The signal is then applied through second afc limiter V122 to afc discriminator V123. The output of afc discriminator V123 is applied to FREQ DRIFT meter M103. FREQ DRIFT meter M103 indicates when afc discriminator V123 is properly tuned.

(2) When XTAL SEL switch S106 is in the DECADE CHANS position, the 2.5-mc tuned circuit is connected to crystal oscillator V114 and the 2.5-mc crystal is selected. The 2.5-mc output is applied through 2.5-mc pulse generator V115 to cathode follower V116-A. The output of cathode follower V116A is applied to pulsed oscillator

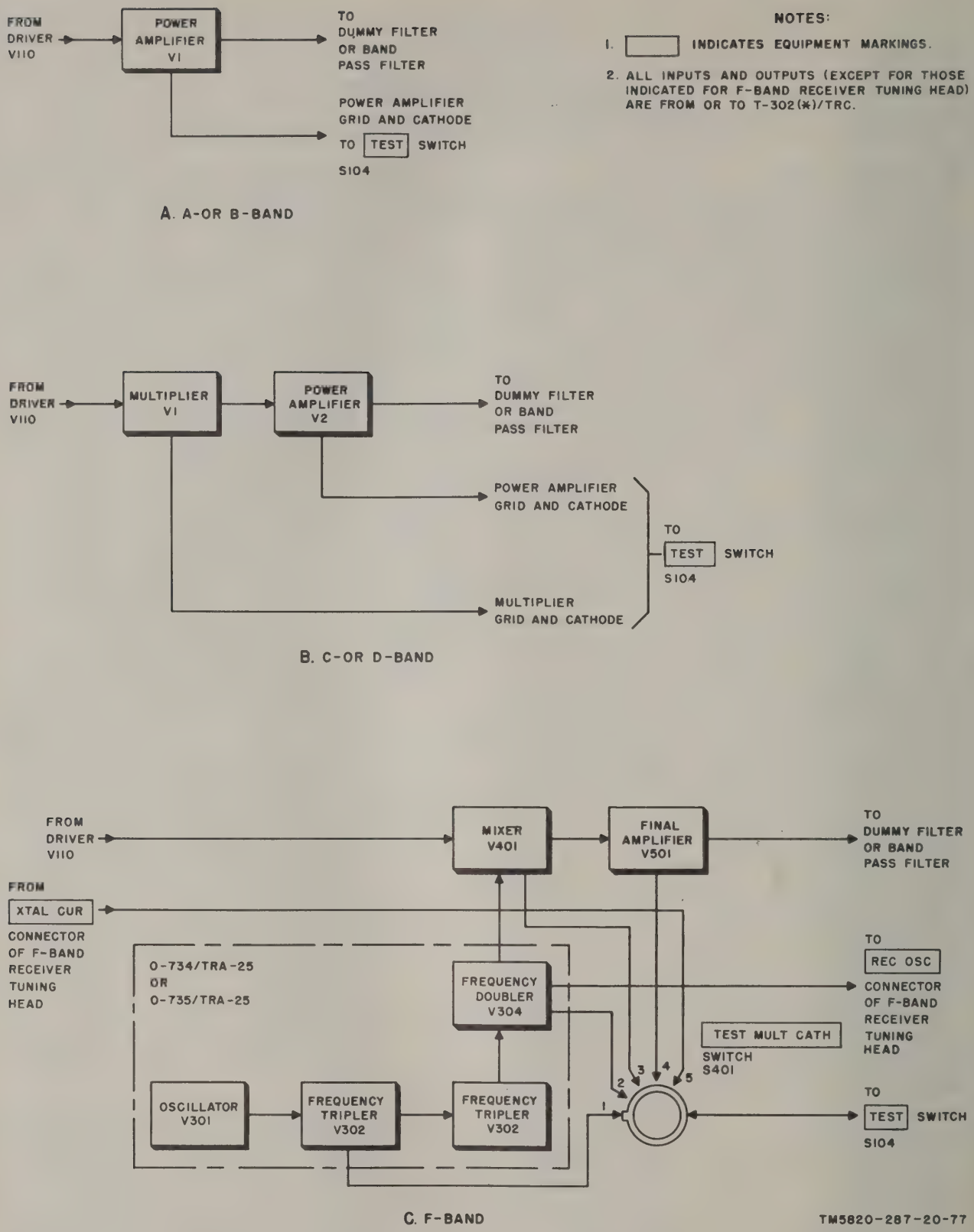


Figure 76. Transmitter tuning head, block diagram.

V116B. Pulse oscillator V116B is tuned to 10.125 mc above the frequency of base rf oscillator V107 for odd rf channel numbers, and 10.125 mc below for even rf channel numbers. Each channel frequency of base rf oscillator V107 is separated by 0.25 mc. Thus, every even channel frequency and every odd channel frequency is separated by 0.5 mc. Further analysis shows that each 10th channel frequency of the base rf oscillator is separated by 2.5 mc. The output of pulse oscillator V116B is a number of frequencies: the frequency that it is tuned to plus additional frequencies above and below the tuned frequency. All of the frequencies are separated by 2.5 mc which are equivalent to 10.125 mc above every odd 10th channel frequency of base rf oscillator V107 and 10.125 mc below every even 10th channel frequency. The output frequencies of pulsed oscillator V116B and the output frequency of base rf oscillator V107 are applied to afc mixer V117. When these frequencies are mixed and a 10.125-mc frequency is produced, the 10.125-mc frequency is amplified by first and second afc amplifiers V118 and V119 and applied through MEASURE switch S102 to MEASURE meter M101. Thus, tuning of base rf oscillator V107 will provide a maximum indication on MEASURE meter M101 for each decade (every 10th) channel.

(3) When XTAL SEL switch S106 is in the UNIT CHANS position, the 1.0-mc tuned circuit is connected to crystal oscillator V114 and a 1.0-mc crystal is selected. The 1.0-mc output is applied to 0.5-mc pulsed generator V113. The output of 0.5-mc pulsed generator V113 is applied through cathode follower V116A to pulsed oscillator V116B. The output of pulsed oscillator V116B in this case is the frequency that it is tuned to plus additional frequencies above and below the tuned frequency. All the frequencies are separated by 0.5 mc which is equivalent to 10.125 mc above each odd channel frequency of base rf oscillator V107 or 10.125 mc below each even channel frequency. The output frequencies of pulsed oscillator V-116B and the output frequency of base rf oscillator V107 are applied to afc mixer V117. When these frequencies are mixed and a 10.125-mc frequency is produced, the 10.125-mc frequency is amplified by first and second afc if. amplifiers V118 and V119 and applied through MEASURE switch S102 to MEASURE meter M101. Thus, tuning of base rf oscillator V107 will provide a maximum indication on MEASURE meter M101 for each odd or even channel. The output of second afc if. amplifier V119 is also applied through second afc if. amplifier V120, first and second afc limiter V121 and V122 to afc discriminator V123. When afc discriminator V123 receives a 10-.125-mc signal, there is no output. When the signal frequency increases or decreases slightly, an output is applied to 60-cps modulator V124 which produces a 60-cps signal. The phase relationship of the 60-cps signal is directly proportional to the frequency deviation from 10.125 mc. The 60-cps signal is amplified by first and second 60-cps amplifiers V125A and V125B and applied to afc motor B101. Afc motor B101 adjusts the tuning of base rf oscillator V107 to maintain a stable frequency. Any drift in frequency of base rf oscillator V107 operates afc motor B101 to return base rf oscillator V107 to its original frequency.

d. Measuring Circuits (fig. 75). MEASURE switch S102 selects the signal to be measured during tuning, calibration, or monitoring. The functions of each switch position are as follows:

(1) *RF CHAN TUNE position.* The output from second afc if. amplifier V-119 is applied through contact 1 of MEASURE switch S102 to MEASURE meter M101. This indication enables tuning of base rf oscillator V-107.

(2) *1KC ADJ position.* The output from

1-kilocycle (kc) oscillator V104B is applied through contacts 2 of MEASURE switch S102 and rectifier CR101 to MEASURE meter M101. This indication enables calibration of the output of 1-kc oscillator V104B to a reference level.

(3) *MTR CAL position.* The output from 1-kc oscillator V104B is applied through contacts 3 of MEASURE switch S102, first and second meter amplifiers V103 and V104A, and rectifier CR101 to MEASURE meter M101. This indication enables calibration of first and second meter amplifiers V-103 and V104A to the reference level of 1-kc oscillator V104B ((2) above).

(4) *DISCR RF DRIVE position.* The output of third afc if. amplifier V120 is applied through contact 4 of MEASURE switch S102 to MEASURE meter M101. This indication enables checking of the signal level from base rf oscillator V107 to first afc limiter V121.

(5) *1 KC IN position.* The 1-kc carrier test signal from filter FL101 is applied through contacts 5 of MEASURE switch S102, 1-kc filter FL103, first and second meter amplifiers V103 and V104A, and rectifier CR101 to MEASURE meter M101. This indication enables a monitoring check of the 1-kc carrier test signal level.

(6) *68 KC IN position.* The 68-kc carrier test signal from filter FL101 is applied through contacts 6 of MEASURE switch S102, 68-kc filter FL102, first and second meter amplifiers V103 and V104A, and rectifier CR101 to MEASURE meter M101. This indication enables a monitoring check of the 68-kc carrier test signal level.

(7) *MOD 1KC IN position.* The 1-kc carrier test signal demodulated by afc discriminator V123 is applied through contacts 7 of MEASURE switch S102, 1-kc filter FL103, first and second meter amplifiers V103 and V104A, rectifier CR101 to MEASURE meter M101. This indication enables a monitoring check of the 1-kc carrier test signal modulation level.

(8) *MOD 68 KC IN position.* The 68-kc carrier test signal demodulated by afc discriminator V123 is applied through contacts 8 of MEASURE switch S102, 68-kc filter FL102, first and second meter amplifiers V103 and V104A, and rectifier CR101 to MEASURE meter M101. This indication enables a monitoring check of the 68-kc carrier test signal modulation level.

(9) *MOD ADJ position.* The 1-kc signal from 1-kc oscillator V104B is applied to first base-band amplifier V101 and the various transmission circuits. The 1-kc signal demodulated by afc discriminator V123 is applied through contacts 9 of MEASURE switch S102, 1-kc filter FL103, first and second meter amplifiers V103 and V104A, and rectifier CR101 to MEASURE meter M101. This indication enables calibration of the modulation level.

e. Test Circuits. The various positions of TEST switch S104 connect TEST meter M102 to circuits in driver V110 and circuits in stages of the transmitter tuning head to enable tuning of the transmission circuits. The positions of TEST switch S104 that connect TEST meter M102 to directional coupler DC101 or first alarm amplifier V111 enable monitoring checks of the output power and the reflected power.

f. Alarm Circuits. The output from directional coupler DC101 is applied through first and second alarm amplifiers V111 and V112 to relay K101, LOW PWR ALARM indicator I-101, and buzzer I102. When ALARM switch S105 is in the NOR position, LOW PWR ALARM indicator I101 will illuminate and buzzer I102 will sound when the output power is below a set reference level. When ALARM switch S105 is in the REV position, buzzer I-102 sounds when the output power is above the set reference level. When ALARM switch S-105 is in the OFF position, buzzer I102 will not sound.

57. PP–685(*)/TRC
(fig. 77)

The PP–685(*)/TRC furnishes all the voltages required for the T–302(*)/TRC (para 57). Input voltage is applied through the 115V AC circuit breaker to all the circuits. Filament

voltage for high voltage rectifier V1 and V2 is applied through HV FIL 1A fuse F1 and filament transformer T2. AC VOLTS meter M1 indicates when input voltage is applied. Filament voltage for low voltage rectifier V5 is applied through LV FIL 1.5 AMP fuse F2 and transformer T3. The output of transformer T3 also applies voltage to bias rectifier CR1 to provide —12 volts direct current (dc) to the interlock circuit. Filament voltage for all stages in the T–302(*)/TRC is applied through FIL 1.5A fuse F5 and transformer T5. Input power for the T–302(*)/TRC blower motor is applied through BLO 3A fuse F4. Thermostat S1 controls the input power to blower motor B1. When the 150V DC circuit breaker is operated, plate voltage is applied through transformer T4 to low voltage rectifier V5. Low voltage rectifier V5 applies 250 volts dc directly to the T–302(*)/TRC. Low voltage regulators V7 and V8, low voltage amplifier V9, and voltage regulator V10 apply 150 volts dc to the T–302(*)/TRC. The output of bias rectifier CR1 is applied through overload relay K4 to thermal relay K3. Thermal relay K3 provides a delay to prevent relays K1 and K2 from operating for 1 minute after the 115V AC circuit breaker is operated. When relay K1 and the 750V DC circuit breaker are operated, plate transformer T1 applies plate voltage to high voltage rectifiers V1 and V2. The output of high voltage rectifiers V1 and V2 is applied through high voltage dc amplifier V4 to provide 350 volts dc and through high voltage regulator V3 to provide 750 volts dc for the transmitter tuning head. Overload relay K4 removes input voltage from thermal relay K3 when too much current is drawn from high voltage rectifiers V1 and V2. This in turn prevents relay K1 and K2 from operating and input voltage is removed from transformer T1.

58. R–417(*)/TRC

a. General. The receiving circuits (*b* below) of the R–417(*)/TRC demodulate the carrier signals and order-wire signals from the vhf carrier. The afc circuits (*c* below) maintain frequency stability for the local oscillator in the receiver tuning head and provide accurate tuning. The calibration circuits (*d* below) provide a means of tuning the receiving circuits. The agc circuits (*e* below) provide a means of automatically controlling the gain of the receiving circuits. The squelch and alarm circuits (*f* below) set a signal reference level and provide a visual and aural indication when the signal is below the reference level. The measuring circuits (*g* below) provide a means of checking the receiving circuits and measuring signal levels. The order-wire circuits (*h* below) provide a means of communicating between the radio links. The power supply circuits (*i* below) provide the necessary operating voltages for the electron tubes in the R–417(*)/TRC.

b. Receiving Circuits. The vhf carrier is received by the antenna (fig. 78) and applied through the dummy filter, bandpass filter, or CV–932/TRA–25 (F-band operation only) to the receiver tuning head. The receiver tuning head amplifies the vhf carrier and mixes its frequency with a local oscillator frequency to produce an if. signal. The block diagrams of the receiver tuning heads are shown in figure 79. Note that dual mixing is required to produce the if. signal during F-band operation. The if. signal from the receiver tuning head (fig. 78) is amplified by six if. amplifiers (V102 through V107) and applied to first limiter V109. The signal from first limiter V109 is fed through second limiter V110 to discriminator V111 where the carrier and order-wire signals are removed from the if. signal. The carrier and order-wire signals are then amplified by three base-band amplifiers (V121 through V123) and fed to the spiral-four cable.

c. Afc Circuits. The output of discriminator V111 (fig. 78) is applied to FREQ DRIFT meter M101 to indicate any drift in frequency. Another output is applied to afc modulator V113. The output from afc modulator V113 is amplified through three afc amplifiers (V114, V115A, and V115B) and applied to afc motor B1 (fig. 79) in the receiver tuning head when AFC-OFF-CAL switch S101 is in the AFC position. Any change in the frequency of the local oscillator appears at the output of discriminator V111 (fig. 78). This output is applied through the afc amplifiers to afc motor B1 (fig. 79) which returns the local oscillator to its original frequency.

d. Calibration Circuits (fig. 78). When AFC-OFF-CAL switch S101 is in the CAL position, the output of crystal oscillator V101A is applied through harmonic generator V101B to

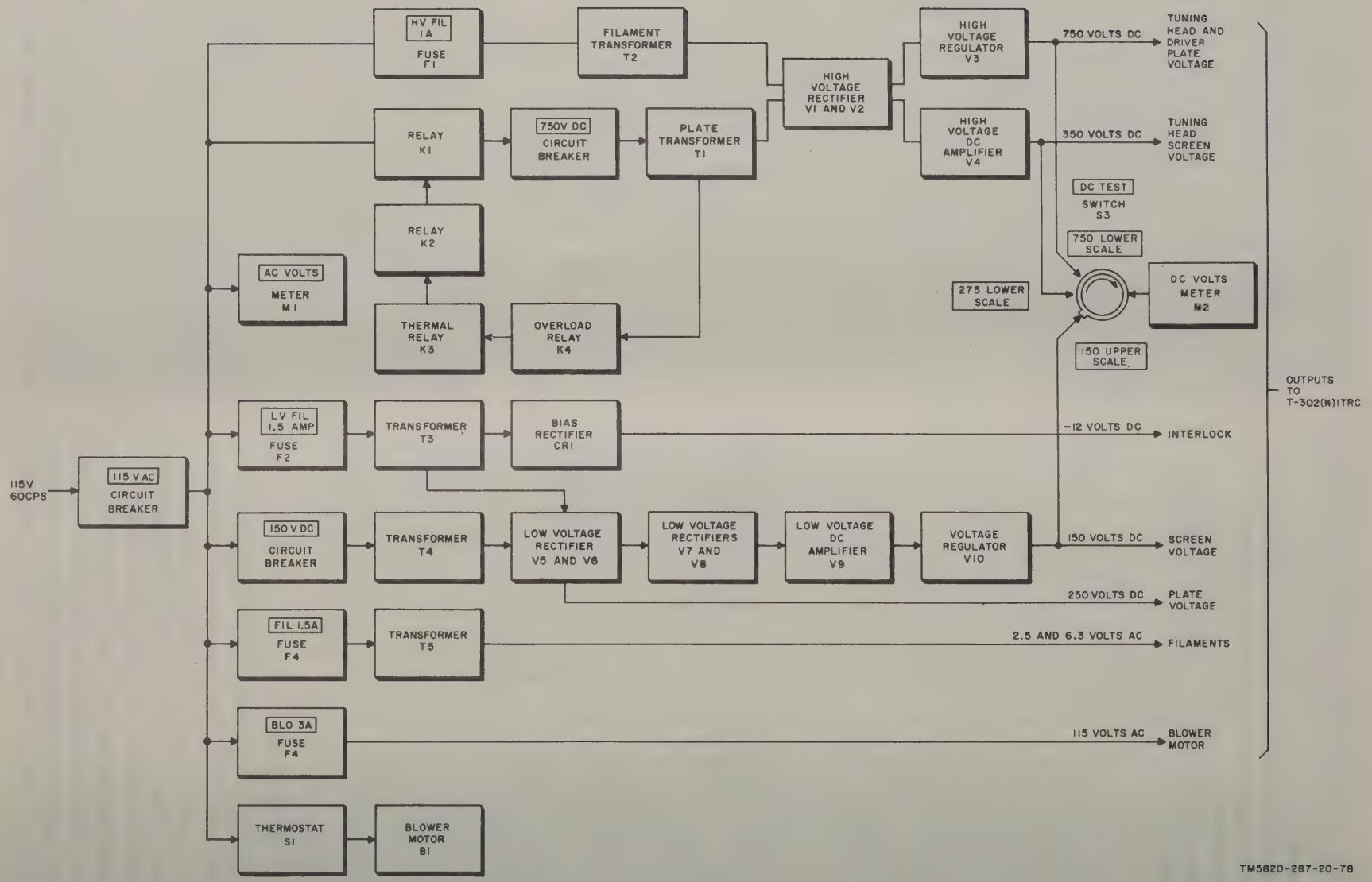


Figure 77. PP–685(*)/TRC, block diagram.

the dummy filter, bandpass filter, or CV–932/TRA–25 (F-band operation only). This frequency is mixed with the local oscillator frequency in the receiver tuning head to produce an if. and fed through the if. amplifiers and limiters to discriminator V111. The output from discriminator V111 provides an indication on FREQ DRIFT meter M101 for calibrating the receiver tuning head.

e. Agc Circuits (fig. 78). The output from sixth if. amplifier V107 is applied to automatic gain control (agc) detector V108. Agc detector V108 produces a bias voltage that is applied to first, second, third, and fourth if. amplifiers V102 through V105. Any increase in signal increases the bias which decreases the amplification. Thus, the level of output signal is automatically controlled.

f. Squelch and Alarm Circuits (fig. 78). The bias produced by agc detector V108 is also applied to squelch V125. Bias oscillator V112A and bias rectifier V112B produce a fixed bias level for squelch V125. When the bias voltage from agc detector V108 overcomes the fixed bias level, squelch V125 becomes inoperative. When the bias voltage from agc detector V108 is too small to overcome the fixed bias level, squelch V125 operates. Squelch V125 controls second limiter V110. When squelch V125 operates, there is no output from second limiter V110. When squelch V125 is inoperative, there is output from second limiter V110. Thus, weak signals will cause squelch V125 to operate and there is no output to the spiral-four cable. ALARM indicator I102 provides a visual indication when squelch V125 is operating and is extinguished when squelch V125 is inoperative. When ALARM switch S104 is in the NOR position, buzzer I103 provides an audible indication when squelch V125 is operating and is silent when squelch V125 is inoperative. When ALARM switch S104 is in the REV position, buzzer I103 provides an audible indication when squelch V125 is inoperative and is silent when V125 is operating.

g. Measuring Circuits. MEASURE switch S106 (fig. 78) selects the signal to be measured during tuning, calibration, or monitoring. The function of each switch position is as follows:

(1) *OSC position.* The grid circuit of the local oscillator (fig. 79) in the receiver tuning head (fig. 78) is connected through contact 1 of MEASURE switch S106 to MEASURE meter M-102. This position of the MEASURE switch indicates that the local oscillator of the receiver tuning head is operating.

(2) *MIX position.* The grid circuit of the mixer (fig. 79) in the receiver tuning head (fig. 78) is connected through contact 2 of MEASURE switch S106 to MEASURE meter M102. This position of the MEASURE switch indicates that the mixer of the receiver tuning head is operating.

(3) *SIG LEV position.* The output from agc detector V108 is applied through contact 3 of MEASURE switch S102 to MEASURE meter M102. This position of the MEASURE switch indicates the signal level.

(4) *1ST LIM position.* The grid circuit from first limiter V109 is connected through contact 4 of MEASURE switch S102 to MEASURE meter M-102. This position of the MEASURE switch indicates that first limiter V-109 is operating.

(5) *2ND LIM position.* The grid circuit of second limiter V110 is connected through contact 5 of MEASURE switch S106 to MEASURE meter M-102. This position of the MEASURE switch indicates that second limiter V110 is operating.

(6) *AFC BAL position.* The grid circuit of afc modulator V113 is connected through contact 6 of MEASURE switch S106 to MEASURE meter M-102. This position of the MEASURE switch indicates that modulator V113 is operating.

(7) *MTR CAL position.* The 1-kc signal from 1-kc oscillator V104B (fig. 75) of the T–302(*)/TRC is connected through contact 7 of MEASURE switch S106 (fig. 78) and meter amplifier V124B to MEASURE meter M102. This position of the MEASURE switch enables calibration of meter amplifier V124B.

(8) *1 KC OUT position.* The 1-kc carrier test signal is taken from third base-

band amplifier V124 and applied through 1-kc filter FL102, contacts 8 of MEASURE switch S106 and meter amplifier V124B to MEASURE meter M102. This position of the MEASURE switch enables monitoring of the 1-kc carrier test signal level.

(9) *68 KC OUT position.* The 68-kc carrier test signal is taken from third base-band amplifier V123 and applied through 68-kc filter FL101, 68-kc amplifier V124A, contacts 9 of MEASURE switch S106 and meter amplifier V124B to MEASURE meter M102. This position of the MEASURE switch enables monitoring of the 68-kc carrier test signal level.

(10) *B+ position.* The output from voltage regulator V120 is connected through contact 10 of MEASURE switch S-106 to MEASURE meter M102. This position of the MEASURE switch indicates that the power supply circuits (*i* below) are operating.

h. Order-Wire Circuits.

(1) *Receiving.* Order-wire signals received from the spiral-four cable (fig. 75) are applied through filter FL101, first and second phone amplifiers V-126A and V126B (fig. 78), and low-pass filter FL104 to the phone section of Handset H–90/U. The received ringing signal (1,600 cycles per second (cps)) is taken from second phone amplifier V126B and applied to ringer amplifier V127A. The output of ringer amplifier V127A is applied to 1,000-cps rectifier V128A and 1,600-cps rectifier V128B. The output of 1,000-cps rectifier V128A is applied to ringer V129A as a bias to safeguard against the false ringing. The output of 1,600-cps rectifier V128B is applied to ringer V129 to operate the buzzer and illuminate RING indicator I104. When the 1,600-cps ringing signal is not present, the buzzer will not sound and RING indicator I104 will not illuminate.

(2) *Transmitting.* When TALK-RING switch S105 (fig. 78) is in the RING position, the output of 1,600-cps oscillator V127B is applied through microphone amplifier V129B to first base-band amplifier V101 (fig. 75) for transmission. The output of 1,600-cps oscillator V127B is also applied through ringer amplifier V127A, 1,600-cps rectifier V128B and ringer V129A to operate buzzer I103 and RING indicator I104. When TALK-RING switch S103 is in the TALK position, the output of the microphone of Handset H–90/U is applied to microphone amplifier V129B for transmission.

i. Power Supply Circuits (fig. 78). The 115-volt, 60-cps input is applied to rectifier V116 and V117 to provide the dc power. The dc power is applied through current regulator V-118, dc amplifier V119, and voltage regulator V120 to the plates and screens of the electron tubes in the R–417(*)/TRC.

band amplifier V124 and applied through 1-kc filter FL102, contacts 8 of MEASURE switch S106 and meter amplifier V124B to MEASURE meter M102. This position of the MEASURE switch enables monitoring of the 1-kc carrier test signal level.

(9) *68 KC OUT position.* The 68-kc carrier test signal is taken from third base-band amplifier V123 and applied through 68-kc filter FL101, 68-kc amplifier V124A, contacts 9 of MEASURE switch S106 and meter amplifier V124B to MEASURE meter M102. This position of the MEASURE switch enables monitoring of the 68-kc carrier test signal level.

(10) *B+ position.* The output from voltage regulator V120 is connected through contact 10 of MEASURE switch S-106 to MEASURE meter M102. This position of the MEASURE switch indicates that the power supply circuits (*i* below) are operating.

h. Order-Wire Circuits.

(1) *Receiving.* Order-wire signals received from the spiral-four cable (fig. 75) are applied through filter FL101, first and second phone amplifiers V-126A and V126B (fig. 78), and low-pass filter FL104 to the phone section of Handset H–90/U. The received ringing signal (1,600 cycles per second (cps)) is taken from second phone amplifier V126B and applied to ringer amplifier V127A. The output of ringer amplifier V127A is applied to 1,000-cps rectifier V128A and 1,600-cps rectifier V128B. The output of 1,000-cps rectifier V128A is applied to ringer V129A as a bias to safeguard against the false ringing. The output of 1,600-cps rectifier V128B is applied to ringer V129 to operate the buzzer and illuminate RING indicator I104. When the 1,600-cps ringing signal is not present, the buzzer will not sound and RING indicator I104 will not illuminate.

(2) *Transmitting.* When TALK-RING switch S105 (fig. 78) is in the RING position, the output of 1,600-cps oscillator V127B is applied through microphone amplifier V129B to first base-band amplifier V101 (fig. 75) for transmission. The output of 1,600-cps oscillator V127B is also applied through ringer amplifier V127A, 1,600-cps rectifier V128B and ringer V129A to operate buzzer I103 and RING indicator I104. When TALK-RING switch S103 is in the TALK position, the output of the microphone of Handset H–90/U is applied to microphone amplifier V129B for transmission.

i. Power Supply Circuits (fig. 78). The 115-volt, 60-cps input is applied to rectifier V116 and V117 to provide the dc power. The dc power is applied through current regulator V-118, dc amplifier V119, and voltage regulator V120 to the plates and screens of the electron tubes in the R–417(*)/TRC.

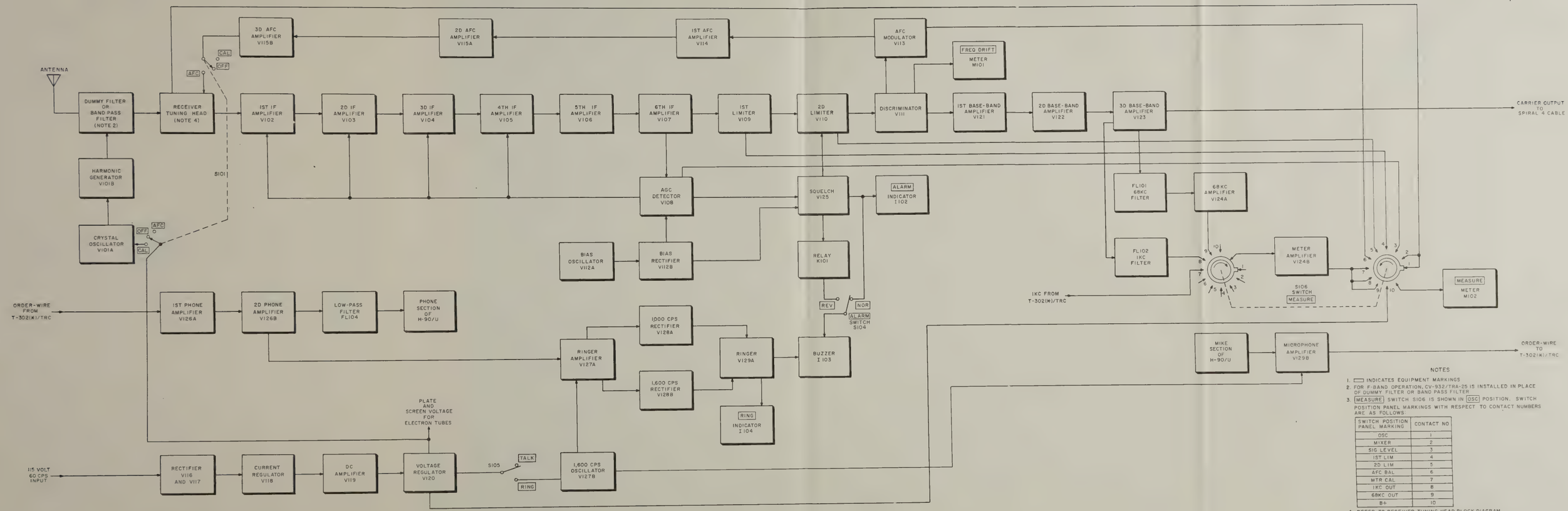


Figure 78. R-417(*)/TRC, block diagram.

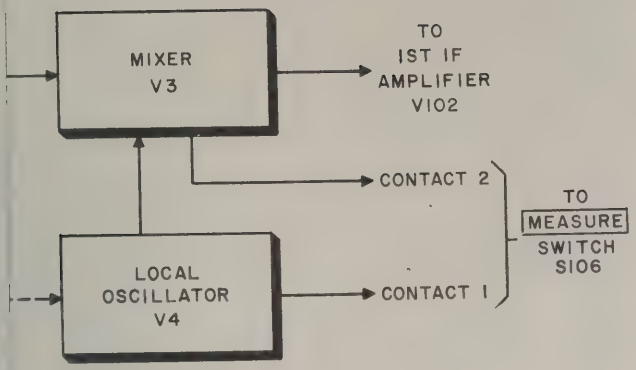
NOTES

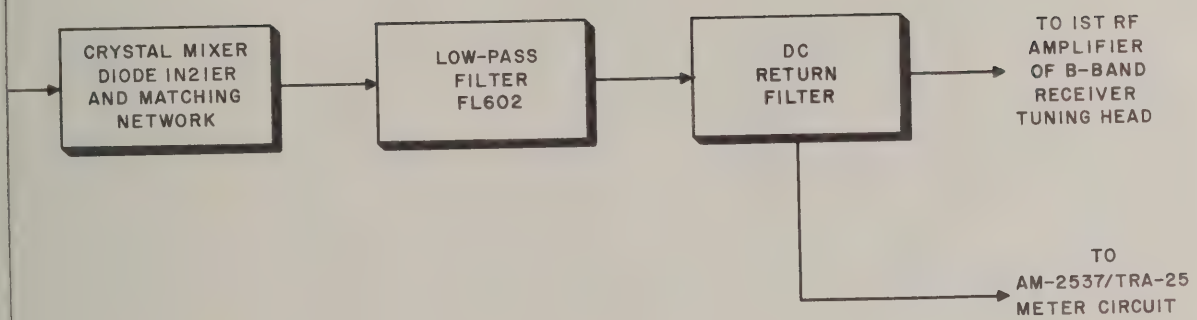
1. ▭ INDICATES EQUIPMENT MARKINGS
2. FOR F-BAND OPERATION, CV-932/TRA-25 IS INSTALLED IN PLACE OF DUMMY FILTER OR BAND PASS FILTER.
3. MEASURE SWITCH S106 IS SHOWN IN OSC POSITION. SWITCH POSITION PANEL MARKINGS WITH RESPECT TO CONTACT NUMBERS ARE AS FOLLOWS:

SWITCH POSITION PANEL MARKING	CONTACT NO
OSC	1
MIXER	2
SIG LEVEL	3
1ST LIM	4
2D LIM	5
AFC BAL	6
MTR CAL	7
1KC OUT	8
68KC OUT	9
B+	10

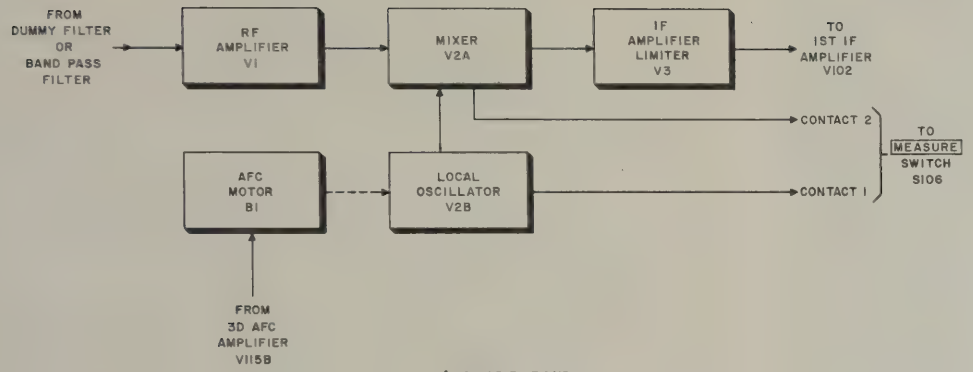
4. REFER TO RECEIVER TUNING HEAD BLOCK DIAGRAM
5. – – – – INDICATES MECHANICAL LINKAGE

TM5820-287-20-79

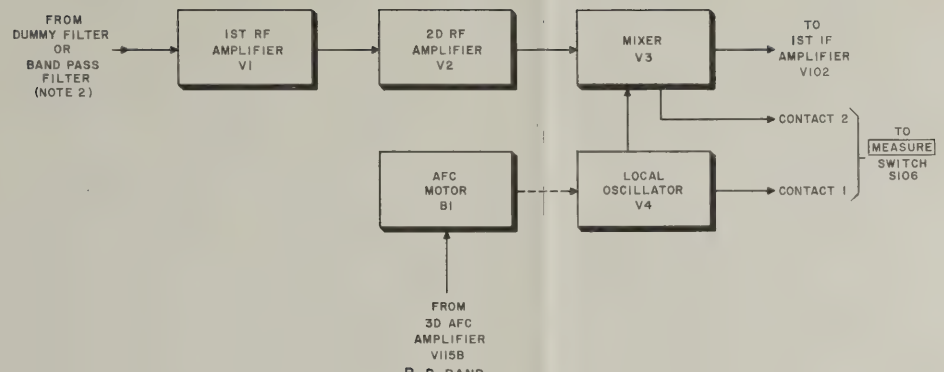

MIXER
V3
TO
IST IF
AMPLIFIER
V102
CONTACT 2
TO
MEASURE
SWITCH
S106
LOCAL
OSCILLATOR
V4
CONTACT 1


CRYSTAL MIXER
DIODE IN21ER
AND MATCHING
NETWORK
LOW-PASS
FILTER
FL602
DC
RETURN
FILTER
TO IST RF
AMPLIFIER
OF B-BAND
RECEIVER
TUNING HEAD
TO
AM-2537/TRA-25
METER CIRCUIT

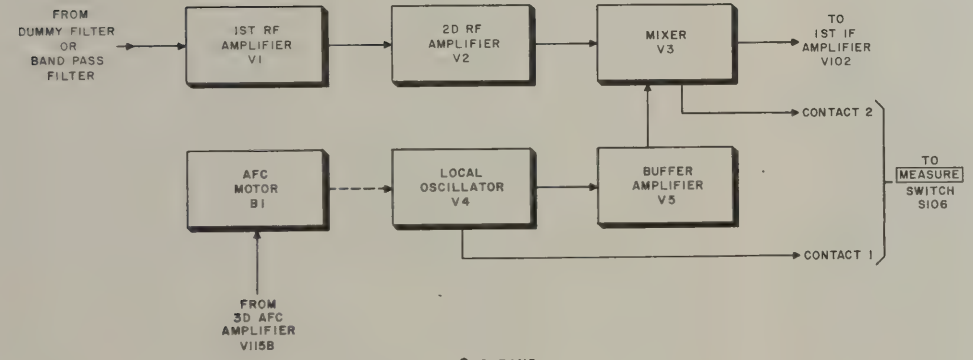
D. F-BAND



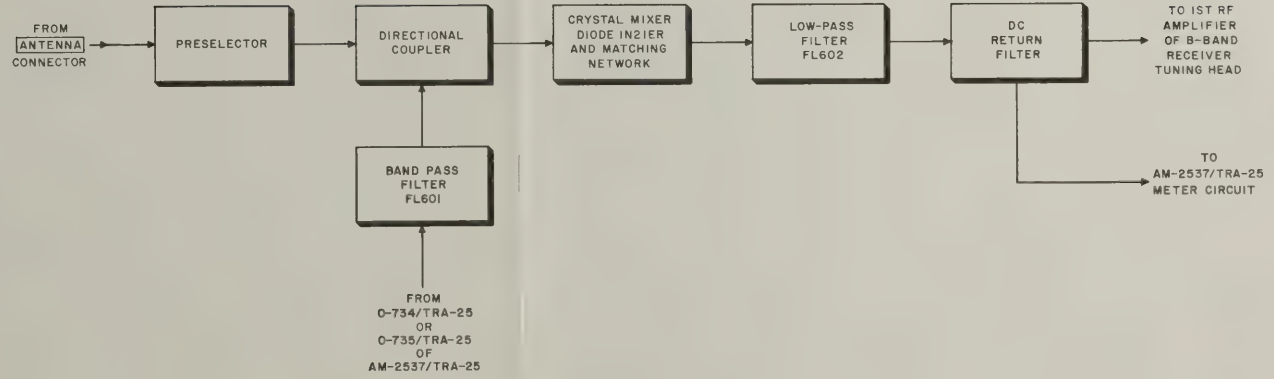
A. A- OR B- BAND



B. D-BAND



C. C-BAND


FROM ANTENNA CONNECTOR
PRESELECTOR
DIRECTIONAL COUPLER
CRYSTAL MIXER DIODE IN21ER AND MATCHING NETWORK
LOW-PASS FILTER FL602
DC RETURN FILTER
TO 1ST RF AMPLIFIER OF B-BAND RECEIVER TUNING HEAD
TO AM-2537/TRA-25 METER CIRCUIT
BAND PASS FILTER FL601
FROM O-734/TRA-25 OR O-735/TRA-25 OF AM-2537/TRA-25

D. F-BAND

NOTES:

1. ▭ INDICATES EQUIPMENT MARKINGS.
2. FOR F-BAND OPERATION, INPUT IS FROM F-BAND RECEIVER TUNING HEAD.
3. ALL INPUTS (EXCEPT F-BAND RECEIVER TUNING HEAD BAND PASS FILTER FL601) ARE FROM R-417(*)/TRC.
4. ALL OUTPUTS (EXCEPT F-BAND RECEIVER TUNING HEAD) ARE TO R-417(*)/TRC.
5. ---- INDICATES MECHANICAL LINKAGE.

TM5820-267-20-80

Figure 79. Receiver tuning head, block diagram.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE

59. Disassembly

When disassembling the equipment and preparing for repackaging (para 60), refer to the *table of components* (TM 11–5820–287–10) to determine the components and parts that belong in particular carrying cases. To disassemble the radio terminal or radio repeater, proceed as follows.

a. Components.

(1) Disconnect all cables from the equipment (fig. 32, 33, or 34).

(2) Place the receiver and transmitter tuning heads in their carrying cases and secure them by tightening the camlock fasteners.

(3) Place the bandpass filters in their carrying cases and secure them by tightening the camlock fasteners.

(4) Place the SA–331/U, J–532/U, ME–82/U, and the appropriate cables in Case, Accessories CY–1343/TRC.

(5) Place all of the cables, running spares, and the H–90/U in Case, Accessories CY–1342/TRC of the MK–133/TRC.

(6) Install the dummy filters in the T–302(*)/TRC and R–417(*)/TRC and secure them with the camlock fasteners.

(7) Push in the vibration mount (A, fig. 41) of the T–302(*)/TRC.

(8) Replace all covers on the carrying cases and secure them with the fasteners.

b. Antenna Assembly.

(1) Reverse the procedures in paragraphs 27 through 36 to disassemble the antenna assembly.

(2) Wind the CG–1030/U cables on Reel Cable RC–405/TRC (fig. 3).

(3) Place the mast sections in the mast case and the guy stakes in the guy stake carrying case.

(4) Coil all guy ropes and the block and tackle assembly and place them in Case, Accessories CY–1392/G.

(5) Wind all guy wires on the cable reels and place them in Case, Accessories CY–1392/G.

(6) Place the mast base, the gin pole cap, the guy plates, and the guy stake clamps in Case, Accessories CY–1392/G.

60. Repackaging

Refer to paragraphs 3 through 16 to determine the contents of each packing case. Refer to paragraphs 17 through 24 to repack the equipment.

APPENDIX I

REFERENCES

AR 320–5	Dictionary of United States Army Terms.
AR 320–50	Authorized Abbreviations and Brevity Codes.
AR 700–38	Unsatisfactory Equipment Report (Reports Control Symbol CSGLD–247(R2)).
AR 700–58	Report of Damaged or Improper Shipment (Reports Control Symbol CSGLD–66 (Army), BuSandA 4600–6 (Navy), Reports Control Symbol 4600–3 (Marine Corps), Air Force Exempt under Para 7c(3), AFR 174–1)).
DA Pam 108–1	Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings.
DA Pam 310 series	Military Publications Indexes (as applicable).
FM 21–5	Military Training.
FM 21–6	Techniques of Military Instruction.
FM 21–30	Military Symbols.
TB SIG 299	Wattmeter ME–82/U.
TM 11–486–6	Electrical Communications Systems Engineering, Radio.
TM 11–679	Fundamentals of Carrier and Repeater.
TM 11–940A	Gasoline Engine Generator Sets PU–286/G and PU–286A/G
TM 11–2142	Telephone Terminal AN/TCC–3 and Telephone Terminal AN/TCC–23.
TM 11–2150	Telephone Carrier Systems Using Telephone Terminal AN/TCC–7, Telephone Repeater AN/TCC–8 (AN/TCC–21), Telephone Repeater AN/TCC–11 and Telephone Test Set TS–712/TCC–11.
TM 11–5073	Towers AB–216/U and AB–216A/U, Tower Section Guy Kit MK–99/U, Accessory Kit MK–100/U, Set AB–298/U, Guy Kit MK–101/U.
TM 11–5820–203–15	Operation and Organizational Field and Depot Maintenance: Radio Repeater Set AN/MRC–54(V).
TM 11–5820–204–15	Operator, Organizational, Field and Depot Maintenance Manual: Radio Terminal Set AN/MRC–69(V).
TM 11–5820–263–12P	Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Radio Set Group OA–1387/GRC.
TM 11–5820–278–12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List

and Maintenance Allocation Chart for Antenna Group OA–1390/GRC.

TM 11–5820–279–12P Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Amplifier Group OA–1392/GRC.

TM 11–5820–282–12P Operator and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Amplifier Group OA–1394/GRC.

TM 11–5820–287–10 Operator's Manual, Radio Sets AN/TRC–24, AN/GRC–75, AN/GRC–78, and AN/GRC–81, Radio Terminal Sets AN/TRC–35, AN/GRC–76, AN/GRC–79, and AN/GRC–82, Radio Relay Set AN/TRC–36, Radio Repeater Sets AN/GRC–77, AN/GRC–80, and AN/GRC–83, and Radio Set Group AN/TRA–25.

TM 11–5820–287–20P Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Radio Set AN/TRC–24, Radio Terminal Set AN/TRC–35, Radio Relay Set AN/TRC–36, Radio Set AN/GRC–75, Radio Terminal Set AN/GRC–76, Radio Repeater Set AN/GRC–77, Radio Set AN/GRC–78, Radio Terminal Set AN/GRC–79, Radio Repeater Set AN/GRC–80, Radio Set AN/GRC–81, Radio Terminal Set AN/GRC–82 and Radio Repeater Set AN/GRC–83.

TM 11–5820–293–12P Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Antenna Filter Group OA–1397/GRC.

TM 11–5820–296–12P Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Antenna Accessories Group OA–1398/GRC.

TM 11–5820–301–12P Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Generator Set Group OA–1675/GRC.

TM 11–5820–302–12P Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Antenna Group OA–1389/GRC.

TM 11–5820–303–12P Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Power Accessories Group OA–1676/GRC.

TM 11–5820–309–12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Amplifier Group OA–1396/GRC.
TM 11–5820–310–12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Antenna-Filter Group OA–1395/GRC.
TM 11–5820–311–12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Antenna-Filter Group OA–1391/GRC.
TM 11–5820–312–12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Antenna-Filter Group OA–1393/GRC.
TM 11–5820–457–12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Radio Set Group AN/TRA–25.
TM 11–5930–201–15P	Operator's, Organizational, Field and Depot Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Switch Box SA–331/U.
TM 11–6115–202–10P	Basic Issue Items List for Generator Set, Gasoline Engine PU–286/G and Power Unit PE–197.
TM 11–6115–202–20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart: Generator Set, Gasoline Engine PU–286/G and Power Unit PE–197.

APPENDIX II

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

1. General

a. This section assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart (sect. II) are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operation. The function *replace* is to substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* Not used.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

2. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/TRC-24, GROUP A								
RADIO SET AN/TRC-24	replace		X					
ANTENNA-FILTER GROUP OA-1393/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1395/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1392/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1394/GRC	replace		X					Separate MAC
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Seaprate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/TRC-35; GROUP B								
RADIO TERMINAL SET AN/TRC-35	replace		X					
AMPLIFIER GROUP OA-1392/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1394/GRC	replace		X					Separate MAC
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1393/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1395/GRC	replace		X					Separate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/TRC-36; GROUP C								
RADIO RELAY SET AN/TRC-36	replace		X					
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1392/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1394/GRC	replace		X					Separate MAC

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/TRC-24,35,36; AN/GRC-75 thru 83 (continued)								
ANTENNA-FILTER GROUP OA-1393/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1395/GRC	replace		X					Separate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/GRC-75; GROUP D								
RADIO SET AN/GRC-75	replace		X					
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1391/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1390/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/GRC-76; GROUP E								
RADIO TERMINAL SET AN/GRC-76	replace		X					
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1391/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1390/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/GRC-77; GROUP F								
RADIO RELAY SET AN/GRC-77	replace		X					
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1391/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1390/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/TRC-24,35,36; AN/GRC-75 thru 83 (continued)								
AN/GRC-78; GROUP G								
RADIO SET AN/GRC-78	replace		X					
AMPLIFIER GROUP OA 1392/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1396/GRC	replace		X					Separate MAC
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1393/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1397/GRC	replace		X					Separate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP. OA-1387/GRC	replace		X					Separate MAC
AN/GRC-79; GROUP H								
RADIO TERMINAL SET AN/GRC-79	replace		X					
AMPLIFIER GROUP OA-1392/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1396/GRC	replace		X					Separate MAC
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1393/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1397/GRC	replace		X					Separate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/GRC-80; GROUP I								
RADIO RELAY SET AN/GRC-80	replace		X					
AMPLIFIER GROUP OA-1392/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1396/GRC	replace		X					Separate MAC
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1393/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1397/GRC	replace		X					Separate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/TRC-24,35,36; AN/GRC-75 thru 83 (continued)								
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/GRC-81; GROUP J								
RADIO SET AN/GRC-81	replace		X					
AMPLIFIER GROUP OA-1394/ GRC	replace		X					Separate MAC
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1395/GRC	replace		X					Separate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/GRC-82; GROUP K								
RADIO TERMINAL SET AN/GRC-82	replace		X					
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1395/GRC	replace		X					Separate MAC
AMPLIFIER GROUP OA-1394/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA 1676/GRC	replace		X					Separate MAC
RADIO SET GROUP OA-1387/GRC	replace		X					Separate MAC
AN/GRC-83; GROUP L								
RADIO RELAY SET AN/GRC-83	replace		X					
ANTENNA ACCESSORIES GROUP OA-1398/GRC	replace		X					Separate MAC
ANTENNA GROUP OA-1389/GRC	replace		X					Separate MAC
ANTENNA-FILTER GROUP OA-1395/GRC	replace		X					Separate MAC
AMPLIGIER GROUP OA-1394/GRC	replace		X					Separate MAC
GENERATOR SET GROUP OA-1675/GRC	replace		X					Separate MAC
POWER ACCESSORIES GROUP OA-1676/GRC	replace		X					Separate MAC
RADIO SET GROUP AN/TRA-25	replace		X					Separate MAC

	Paragraph	Page
A-band antenna:		
Assembly and installation ..	31	36
Connections (fig. 23)		44
Installation (fig. 22)		43
A-, B-, C-, or D-band antenna, lubrication (fig. 53)		78
Air filter, replacement:		
R–417(*)/TRC or PP–685(*)/TRC	51	97
T–302(*)/TRC	52	113
AM–912(*)/TRC (B-band):		
Lubrication (fig. 48)		73
Tube locations (fig. 59)		101
AM–913/TRC (B-band), tube location (fig. 66)		107
AM–914/TRC (C-band), tube locations (fig. 67)		108
AM–915(*)/TRC, AM–1178/GRC, or AM–1180/TRC, location of tube puller (fig. 36)		62
AM–915(*)/TRC (C-band):		
Lubrication (fig. 49)		74
Tube locations (fig. 60)		102
AM–1177/GRC (D-band), tube locations (fig. 68)		109
AM–1178/GRC (D-band):		
Lubrication (fig. 50)		75
Tube locations (fig. 61)		102
AM–1179/GRC (A-band), tube locations (fig. 65)		106
AM–1180/GRC (A-band):		
Lubrication (fig. 47)		72
Tube locations (fig. 58)		100
AM–2537/TRA–25 (F-band):		
Location of tools (fig. 37) ..		62
Lubrication (fig. 51)		76
Tube locations (fig. 62)		103
Anchoring and positioning mast base (fig. 11)		31
AN/GRC–75, Radio Set, packaging data	5	6
AN/GRC–76, Radio Terminal Set, packaging data	9	9
AN/GRC–78, Radio Set, packaging data	6	7
AN/GRC–79, Radio Terminal Set, packaging data	10	10
AN/GRC–80, Radio Repeater Set, packaging data	14	16
AN/GRC–81, Radio Set, packaging data	7	7
AN/GRC–82, Radio Terminal Set, packaging data	11	12
AN/GRC–83, Radio Repeater Set, packaging data	15	18
Antenna:		
Assembly:		
Erecting and securing ..	36	49
General	26	28
Ground layout plan (fig. 9)		29
Orientation, radio section:		
Multiple-link	42	59
Single-link	41	57
Support parts, lubrication (fig. 54)		79
Support, preparation for assembly	27	28
Antenna assembly AS–1083/TRA–25, Spare tubes; and Oscillator-Multiplier O–734/TRA–25, unpacking (F-band)	24	25
Antenna Reflector AT–414/TRC installation (fig. 16)		37
Antenna Reflector Support AB–325/TRC installation (fig. 15)		35
AN/TRA–25, Radio Set Group, packaging data	16	19
AN/TRC–24, Radio Set, packaging data	4	5
AN/TRC–35, Radio Terminal Set, packaging data	8	8
AN/TRC–36, Radio Relay Set, packaging data	12	13
AN/TRC–77, Radio Repeater Set, packaging data	13	15
Assembly:		
Gin pole	28	30
Mast	29	30
Assembly and installation, antenna:		
A-band	31	36
B-band	32	36
C-band	33	39
D-band	34	48
F-band	35	48
Bandpass filter:		
Control, replacement	55	115
Exploded view of control (fig. 74)		116
B-band antenna:		
Assembly and installation ..	32	36
Installation (fig. 24)		45
B-band or C-band antenna connections (fig. 25)		46
Block diagram theory:		
PP–685(*)/TRC	57	120
R–417(*)/TRC	58	121
T–302(*)/TRC	56	117
Blower motor fan blade, replacement:		
R–417(*)/TRC	53	113
T–302(*)/TRC	54	114
Cable Reel RC–404/TR or RC–405/TR, unpacking	19	20

	Paragraph	Page
Calibrating R–417(*)/TRC	40	57
C-band antenna:		
Assembly and installation	33	39
Installation (fig. 26)		47
Checking, unpacking and checking	25	26
Checklist, equipment performance	49	65
Components:		
Connection	39	52
Installation	38	51
Location	37	49
Connection, components	39	52
CV–932/TRA–25 (F band):		
Lubrication (fig. 52)		77
Parts location (fig. 69)		110
DA Form 11–238:		
Pages 1 and 4 (fig. 38)		63
Pages 2 and 3 (fig. 39)		64
D-band antenna:		
Assembly and installation	34	48
Connections (fig. 28)		49
Installation (fig. 27)		48
Disassembly	59	101
Drawer slide assembly, lubrication (fig. 40)		65
Equipment performance checklist	49	65
Equipment siting considerations	2	3
Erecting and securing antenna assembly	36	49
F-band antenna:		
Assembly and installation	35	48
Installation (fig. 29)		50
Gasoline Engine Generator Set PU–286/G, unpacking	20	20
Gin pole:		
Assembly	28	30
Guying (fig. 20)		41
Raising and securing	30	36
Secured in vertical position (fig. 21)		42
Good and bad siting locations (fig. 1)		4
Guy plate installed and guyed (fig. 14)		34
Guy stake anchored and guyed (fig. 19) in ground		40
Inspection, visual	48	65
Installation, components	38	51
Location, components	37	49
Lubrication	47	62
Maintenance:		
Preventive	46	61
Scope of second echelon	44	61
Mast:		
And gin pole lying on ground (fig. 18)		39
Assembly	29	30
Base of antenna support (fig. 10)		30
Case and guy stake carrying case, unpacking	23	20
Section installation (fig. 13)		33
Measurements, noise	43	60
Multiple-link radio section antenna orientation	42	59
MX–148/G, Ground Rod, unpacking	21	20
Noise measurements	43	60
Orientation, radio section antenna:		
Multiple-link	42	59
Single-link	41	57
Packaging and packing diagram:		
F-band (fig. 8)		27
Gasoline drums (fig. 6)		24
Ground Rod (fig. 5)		23
Mast case or guy stake carrying case (fig. 7)		25
PU–286/G (fig. 4)		23
Reel, cable (fig. 3)		22
Packaging data:		
General	3	5
Radio Relay Set AN/TRC–36	12	13
Radio Repeater Set:		
AN/GRC–80	14	16
AN/GRC–83	15	18
AN/TRC–77	13	15
Radio Set:		
AN/GRC–75	5	6
AN/GRC–78	6	7
AN/GRC–81	7	7
AN/TRC–24	4	5
Radio Set Group AN/TRA–25	16	19
Radio Terminal Set:		
AN/GRC–76	9	9
AN/GRC–79	10	10
AN/GRC–82	11	12
AN/TRC–35	8	8
PP–685(*)/TRC:		
Block diagram (fig. 77)		122
Block diagram theory	57	120
Location of air filter (fig. 71)		112
Lubrication (fig. 46)		71
Tube locations (fig. 55)		98
PP–685(*)/TRC or R–417(*)/TRC, air filter replacement	51	97
Preparation for assembly, antenna support	27	28
Preventive maintenance	46	61
R–417(*)/TRC:		
Block diagram (fig. 78)		122
Block diagram theory	58	121

	Paragraph	Page
Calibration	40	57
Calibration adjustments (fig. 35)		58
Front panel controls, lubrication points (fig. 44)		69
Location, air filter (fig. 70)		111
Location, fan blade (fig. 73)		114
Lubrication (fig. 45)		70
Replacement of blower motor fan blade	53	113
Tube locations (fig. 63)		104
Tube locations (fig. 64)		105
R–417(*)/TRC or PP–685(*)/TRC, air filter replacement	51	97
Radio:		
Repeater connections, A-, B-, C-, or D-band operation (fig. 34)		56
Terminal connections, A-, B-, C-, or D-band operation (fig. 32)		54
Terminal connections, F-band operation (fig. 33)		55
Raising and securing gin pole	30	36
Raising antenna (fig. 30)		51
Receiver tuning head, block diagram (fig. 79)		122
Repackaging	60	125
Replacement:		
Air filter, PP–685(*)/TRC or R–417(*)/TRC	51	97
Air filter, T–302(*)/TRC	52	113
Bandpass filter control	55	115
Blower motor fan blade:		
R–417(*)/TRC	53	113
Fan blade, T–302(*)/TRC	54	114
Scope, introduction	1	3
Scope of second echelon maintenance	44	61
Second echelon maintenance, scope	44	61
Single-link radio section antenna orientation	41	57
Siting consideration, equipment	2	3
Stake, (fig. 12)		32
T–302(*)/TRC:		
Block diagram (fig. 75)		118
Block diagram theory	56	117
Location air filter (fig. 72)		113
Lubrication (fig. 41, 42, and 43)		66–68
Lubrication		62
Replacement, air filter	52	113
Replacement, blower motor fan blade	54	114
Transmitter tuning head block diagram (fig. 76)		118
Tube locations (fig. 56 and 57)		99, 100
Tube testing and replacement	50	97
Two Antenna Reflectors AT–414/TRC, installation (fig. 17)		38
Typical packing and packaging diagram (fig. 2)		21
Typical radio component installation (fig. 31)		52
Unpacking and checking:		
Antenna Assembly AS–1083/TRA–25, spare tubes, and Oscillator-Multiplier O–735/TRA–25	24	25
Equipment in carrying cases	18	20
Gasoline drums	22	20
General	17	20
Generator Set, Gasoline Engine PU–286/G	20	20
Ground Rod MX–148/G	21	20
Mast case or guy stake carrying case	23	20
Reel, Cable RC–404/TR or RC–405/TR	19	20
Visual inspection	48	65

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USAR: None.

For explanation of abbreviations used, see AR 320–50.

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